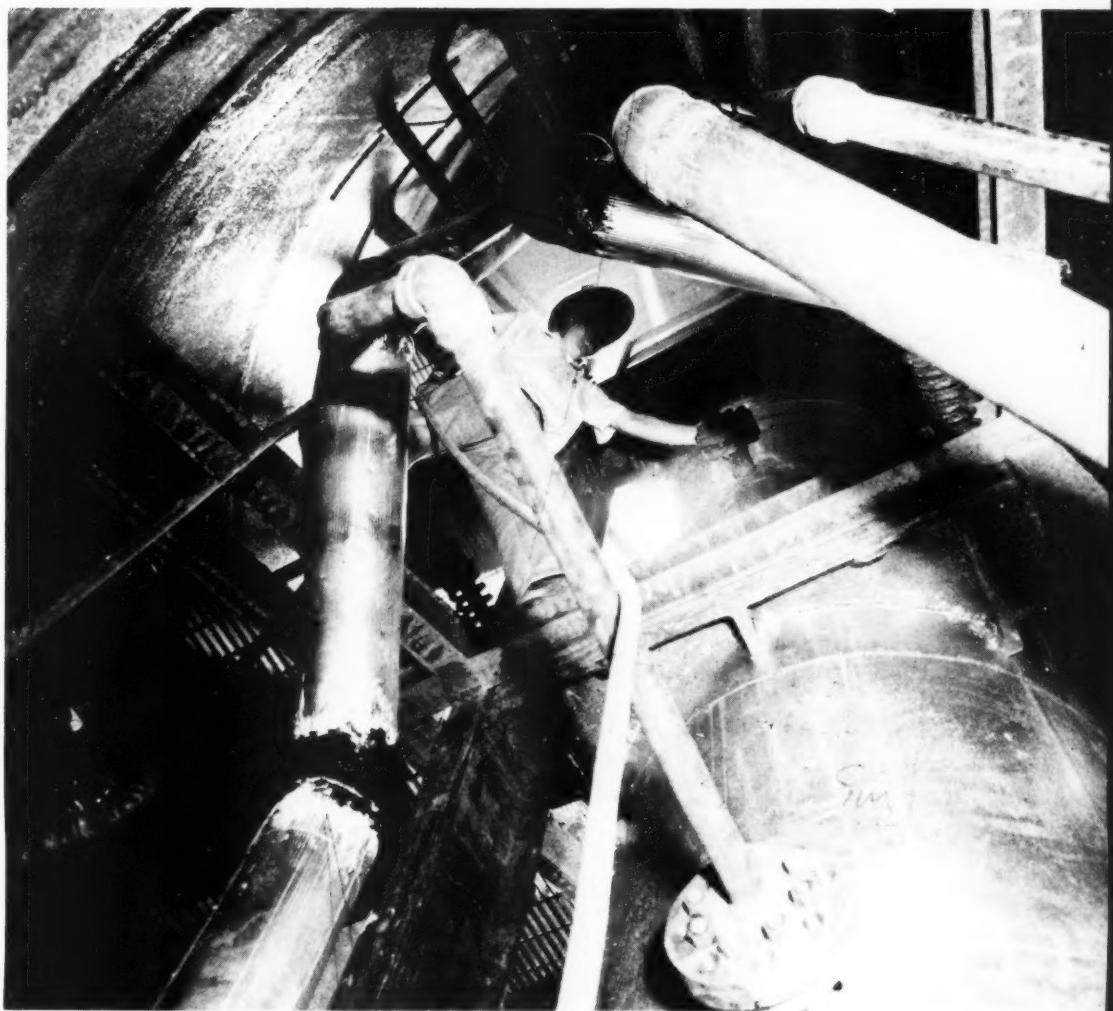


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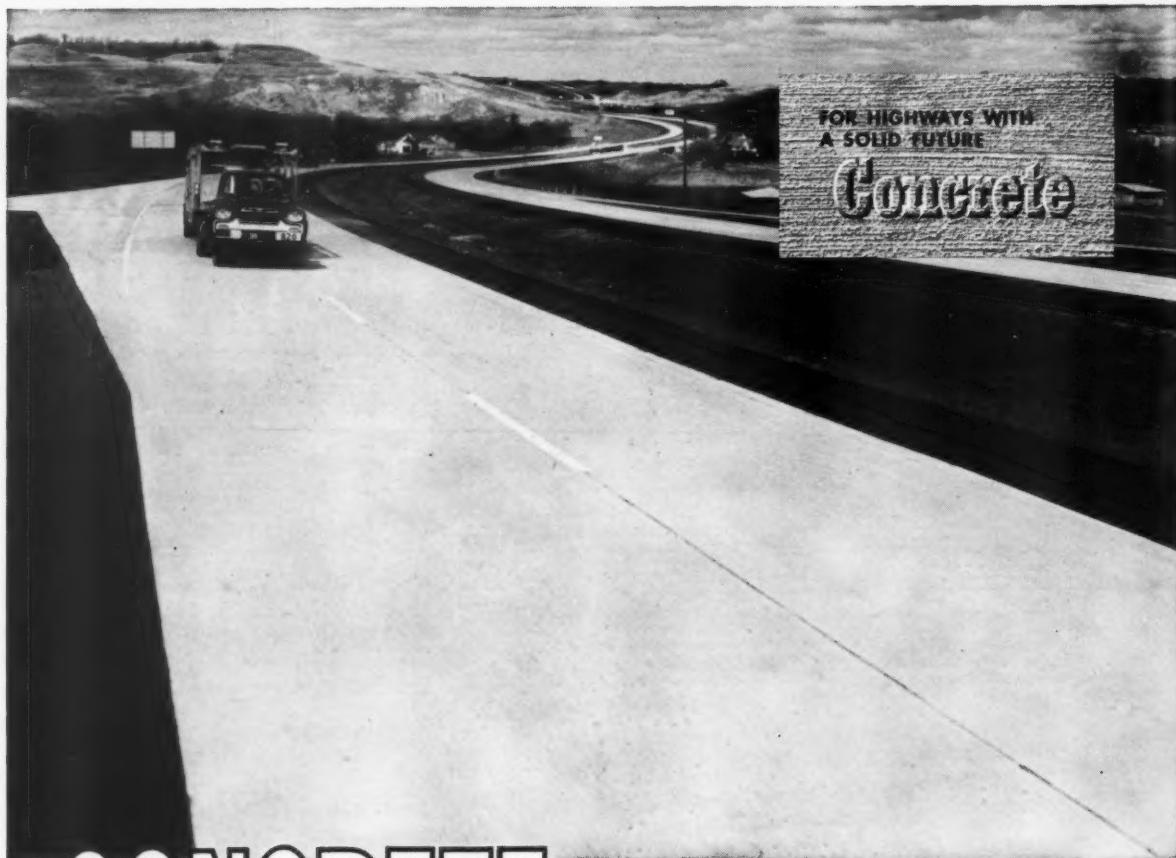


WSE'S KICK-OFF DINNER MEETING — PAGE TWO

Vol. 12

OCTOBER, 1959

No. 3



FOR HIGHWAYS WITH
A SOLID FUTURE

Concrete

CONCRETE will save taxpayers \$2,835,000 on the first 39 miles of North Dakota's Interstate 94!

North Dakota chose concrete to get the big savings where they count most—on upkeep. On the 39-mile stretch between Jamestown and Valley City—and for other sections of the Interstate System—North Dakota had good reasons for choosing concrete. *Concrete means tax savings and real dollar value.*

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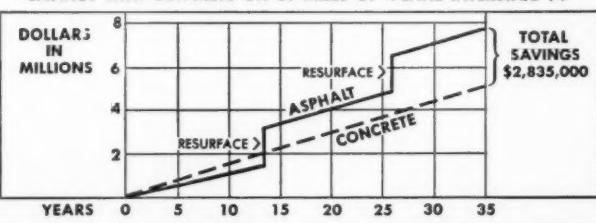
A graph of total costs (amortization of first cost plus surface maintenance) is shown for concrete and asphalt designs considered for first section of North Dakota's Interstate 94. Routine maintenance figures are based on averages from 28 reporting states. Asphalt resurfacing schedule is based on Bureau of Public Roads life expectancy studies.

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A national organization to improve and extend the uses of concrete

SAVINGS WITH CONCRETE ON 39 MILES OF 4-LANE INTERSTATE 94



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MIDWEST ENGINEER

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84 East Randolph Street, Chicago 1, Illinois

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October, 1959

Vol. 12, No. 3

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COVER STORY

The workman shown in our unusual cover picture is standing inside the test rig which Sargent & Lundy engineers are using to prove that the size of nuclear plant containment vessels can be considerably reduced. By rupturing a simulated reactor inside a containment shell and by instantaneously mixing the escaping 8000 pounds of 600 psi boiling water with cold water, the engineers have shown that the resulting pressure created in the containment vessel is only a small fraction of what it would be without the cold water mixing. The use of this principle will permit designers to use a new approach to sizing containment structures for nuclear power reactors.

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SEPTEMBER 16, 1959



Program Chairmen for this year and last:
H. R. Heckendorf and Trustee Frank Scott



In the Dining Room, Trustee Virgil E. Gunlock, Speaker Robert O. Jordan, Trustee Robert H. Bacon (standing), WSE President Joe Rettaliata, and Speaker Elliott M. Moore pause in their conversa-



Young Engineers' Forum Chairman for 1959, Richard N. Bergstrom, and First V.P. Maxson, discuss plans



There are publication points to be discussed, too.
Managing Editor Eaton and Chairman Bill Fulton talk



Advertising is another important subject. Virgil E. Gunlock and Robert H. Bacon make some plans

DINNER

OFF

WSE's KICK-

What does the newly redecorated WSE Headquarters look like? Quite a number of WSE members wondered—and came out to see—the evening of September 14. That was the night of the Kick-Off Dinner.

And what did the WSE'ers see? Why a pleasant, attractively decorated Lounge where, for the hour preceding dinner in the also newly refurnished Dining Room, they were pleased to meet and talk with their old and new friends and associates.

At 6:30 p.m. the WSE'ers filled the apple-green and yellow Dining Room, as per schedule, and tested, and tasted, with approval, the new food service.

After dessert, Dr. Rettaliata, president of the Western Society and of the Illinois Institute of Technology, opened a short meeting in the Dining Room. First he introduced those sitting at the Speaker's Table. These included WSE Treasurer Ernest R. Hendrickson, trustees Robert H. Bacon, Virgil E. Gunlock, Carl A. Metz, S. Robert Price, and Frank M. Scott; and the two guest speakers, Robert Oakes Jordan and Elliott M. Moore.

Robert H. Bacon then took the floor for a moment, and explained the purpose of the new luncheon ticket plan. He urged all members to take advantage of the plan.

Dr. Rettaliata then spoke briefly on the primary objective of the Western Society for the current 1959-60 year, namely, the objective of strengthening the Society. He stressed two points—bettering the financial situation, and increasing the membership—as being of the most importance in achieving the objective.

He indicated, too, that there is a great opportunity for the Western Society to be the Center of Engineering in the Midwest. The Western Society, he pointed out, has members from the several fields of engineer-

ing, a most comprehensive organization, and the best quarters in the area.

Many of the committee chairmen next gave short talks on their plans, and indicated that this 90th Anniversary year will be the most active in WSE's history. Those chairmen speaking included Merlin J. Adams, chairman of the House Committee; Richard N. Bergstrom, Young Engineers' Forum; Le Roy H. Cather, Special Events; Bernard T. Feery, Admissions; Donald H. Worcester, Excursions; and Howard A. Carter, chairman of the new Education and Research Division.

Fred R. Bruce, Western Society secretary, was next introduced. He spoke to the effect that a small but very loyal staff is at the service of the Western Society.

Dr. Rettaliata then adjourned the meeting to the Seventh Floor for the demonstration lecture, entitled "Stereophonic Sound—A New Means of Communication." Robert H. Bacon opened this meeting and introduced the speakers, Robert Oakes Jordan and Elliott M. Moore.

In his general explanation of the nature of stereophonic sound from both a technical and laymen's standpoint, Robert Oakes Jordan told the audience: "Due to the space-time differential, stereo is not only pleasing, but readily received by the human hearing system."

Jordan then demonstrated this explanation by playing some examples of stereo productions produced by Sonic Arts and the Jordan Laboratories and which were directed to the consumer market. For example, a demonstration tape made for the Norelco Company (North American Philips Company) was played in its entirety. This fine demonstration tape was enthusiastically received by the entire membership present at the meeting. In addition, the RCA

Robert O
ident Jo
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hard
plans

(Radio Corporation of America) tape and disc was also played, in part. An added attraction to the evening's program was a demonstration of a film shown with a 16mm projector equipped for stereo sound—the first such machine ever developed. A portion of the latest Motorola demonstration record was also played for the audience.

Elliott M. Moore then took over the program and explained the application of the use of stereo sound in industry. Examples, he explained, were the complete stereo tape produced by Sonic Arts for the Chrysler division of the Chrysler Corporation. This tape, and accompanying film, was shown in 42 markets for Chrysler dealers. Later, it was shown throughout Canada. The comment made after these latter showings was "this is the most effective and successful product training meeting ever put on in Canada."

Moore also explained how his firm



Jordan

had produced a special stereo tape, and slide film, for Brown-Forman Distillers Corporation—shown to sales personnel to introduce a new Christmas package. This film, and sound track, produced excellent sales results for the firm.

Those interested in finding out how stereophonic sound can be of help to their firms may obtain a special brochure describing the company and its services. To do so, all that is necessary is to write to Mr. Elliott M. Moore, president, Sonic Arts, Inc., 333 North Michigan Avenue, Chicago 1, Illinois.

Jordan is a physicist and inventor whose most recent development is the invention of a telephone which is now being used by the totally deaf and blind. He is also the author of many books, the latest being *The Sound of High Fidelity*. Jordan is director of the Laboratories of Robert Oakes Jordan, Highland Park, Illinois. He is in addition the executive

vice president of Sonic Arts, Inc.

Elliott M. Moore is president of Sonic Arts, Inc., a consulting and producing organization serving some of the country's leading firms in the commercial, industrial and educational applications of stereophonic sound. The company creates and produces complete stereophonic sound presentations for use in sales meetings, sales training programs, environmental conditioning classes, demonstration recordings and other recordings. These have been done via tape, disc or synchronized with slide, strip and motion pictures.

Driverless Bus-trains

Passengers in Chicago may soon board driverless bus-trains, if present plans of the local Transit Authority work out, reports *Product Engineering*. The vehicles will be remote controlled with equipment developed by a company that already produces several types of guidance systems for industrial trucks. Actual field testing probably will start in the Spring.



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SEWAGE DISPOSAL 400 YEARS LATER

By Herman Salzman, MWSE

Four hundred years ago, before the colonization of this country, it was safe to drink from almost any stream, river, or lake in America. Since then civilization, with its ever-increasing population and industrial activity, has emptied practically everything into our waterways with little thought of the consequences. This daily discharging of raw, untreated sewage into the country's waterways has created a pollution problem of serious proportions.

Plagues and Epidemics

The failure to properly dispose of human wastes was one of the primary causes of the frequent plagues and epidemics which swept Europe during the Middle Ages. To stop these outbursts, systems of underground pipes were devised to carry the sewage away to nearby waterways. This was not a particularly dangerous practice as long as these wastes were greatly diluted. In fact, this was the method of handling Chicago's sewage for many years—dilution with Lake Michigan water and disposal to the Mississippi River.

With the growth of our communities in both population and industrial activity, concentration of the sewage reached a point which rendered the waters receiving the discharge unsuitable for a source of public water supply. It is true that the water can be sterilized by chlorination or other methods, but to drink treated sewage has not yet become necessary in the Midwest where the water supply is still adequate.

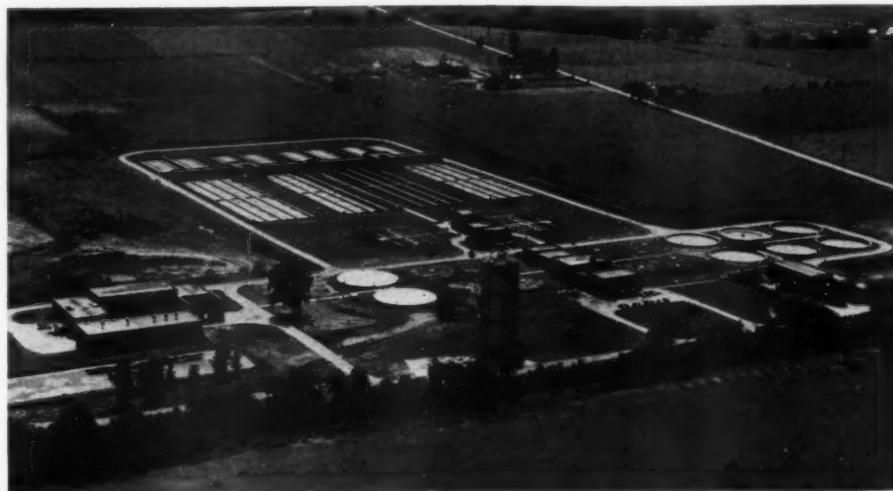
Treatment Speeds Up Nature

Of what is sewage composed? Wastes from dwellings and commercial and industrial establishments, and ground and storm water. It contains, in addition to discharge from the body, waste food, garbage particles, soap, grease, chemicals, etc. either in a suspended or dis-

solved state. Pollution kills fish, makes boating unpleasant, renders water unsuitable for swimming and recreation, and spoils it for drinking purposes.

Sewage treatment is not a mysterious process, but rather a speeding up of the forces of nature. Involved are the set-

coarse suspended material which might otherwise clog sewage pumps or pipe lines. An improvement of the screen is a machine called a Comminuter which grinds the material and returns it to the sewage flow. A grit chamber is a concrete channel to reduce the speed of



—Chicago Pump Company

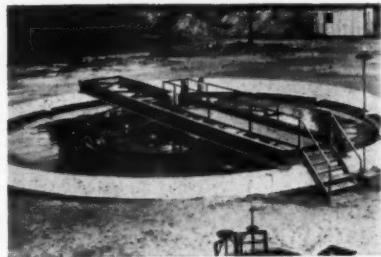
Sewage treatment plant, Columbus, Ohio with floating covers, swing diffuser aeration equipment, and other equipment.

tling of solids, removal of grease and scum, aeration, and action of bacteria and other living organisms. This process, together with disposal of solids and liquids in an approved manner, constitutes primary treatment. Treatment units or processes which may be included in this first phase are screens, grit chambers, sedimentation basins, chemical precipitation, and sludge digestion.

Primary treatment removes only about half of the organic material in sewage. The remaining organic material, mostly in a dissolved state can then be subjected to secondary treatments which are biological processes and require such facilities as sand filters and activated sludge processes.

The screen, usually the first step, consists of a series of evenly spaced parallel bars and is used to intercept floating or

flow, settling out inert particles. The speed of flow is generally further reduced in a settling tank (Fig. 1) in



—Yeomans

Figure 1. Yeo-Flo Clarifier used both primary and final clarification of domestic and process wastes.

order to settle out more particles. This tank is sized so that the sewage entering will pass through slowly, the rate de-



Figure 2. Even distribution across the entire filter bed is accomplished by means of rotary distributor.

pendent upon the capacity of the tank and the treatment plant. The settled material is called sludge and is either collected in a hopper or sent to sludge digestion tanks. Ordinary septic tanks used for small systems accomplish the settling and decomposition in the same chamber, but the efficiency is decreased because of rising gas bubbles interfering with the settling.

By-products Heats Buildings

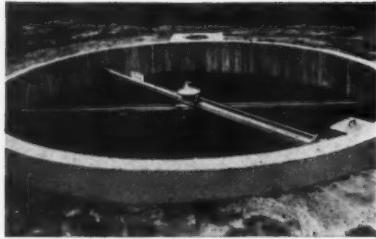
Sludge digestion is carried on in separate tanks by the action of aerobic bacteria. It renders the sludge more suitable for final disposal by removing offensive odors and greatly reducing the volume. The rate of digestion increases with temperature so heat is often introduced. In addition, the gas generated in digestion is burnable and may be used to heat buildings and digestors or to run gas-driven electric generators.

The sludge may be dried in drying beds of gravel and sand, exposed to sun and air. Sludge may also be run through filters with cloth-covered rotating cylinders which pick up the sludge by vacuum thus dewatering it. It can be disposed of by discharging into lagoons, spread on farm land and plowed under, or incinerated. It can also be used as fertilizer if properly prepared.

Secondary Treatment

Secondary treatment involves such units as sand filters, trickling filters or activated sludge process. Intermittent filters are composed of gravel and sand underdrained by open-joint tile. Duplicate units are always provided so that they may be used alternately. Intermittent operation is required in order that air, essential to the life of aerobic bacteria, may be introduced in the interval between sewage applications. From the filter, the treated sewage goes directly to the outlet stream or lake.

Trickling filters (Fig. 2) are composed of stone with sizes graded to



—Pictures Courtesy of Yeomans Brothers Co.

Figure 3. Water wheel, a rotary distributor, which is used with trickling filter systems in secondary treatment of sewage.

prevent clogging. The stone becomes coated with aerobic bacteria which eat the small particles of impurities. The coating on the stones accumulates and finally peels off, but care must be taken that this material does not enter the outlet stream. Sewage enters the filter through spray nozzles or rotary distributors (Fig. 3).

In the activated sludge process, a suspension of aerobic organisms is built



Figure 4. Hi-Cone equipment for surface aeration.

up in the liquid sewage itself. These organisms feed on the organic matter and reduce the amount of impurities. This is done in an aeration tank (Fig. 4) in which compressed air is forced through the liquid, or the surface is mechanically agitated so that air is entrained. This provides oxygen for the bacteria and keeps them in intimate touch with the sewage. The sewage is then run into a final settling tank before it is discharged to the outlet stream (Fig. 5).

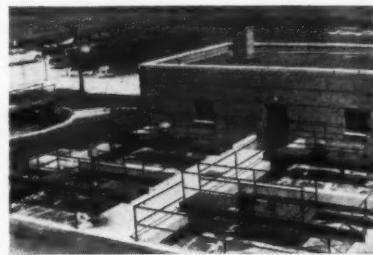


Figure 5. Cavitator of type used for small communities, motels, resorts, schools, and industrial plants.

The settled materials are continually pumped back into the aeration tank or to the sludge digestion tank.

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Electric repairmen are packing pistols on the job, states *Electrical Wholesaling*. The gun fires a jet-propelled cartridge which tows a string through long electrical conduits.

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WSE Luncheons Off to Good Start

Dr. Christopher E. Barthel, Jr., assistant director of Armour Research Foundation, helped get the 1959-60 Noon Luncheon Meetings off to a good start with a talk entitled "New Horizons in Research."

The meeting was called to order in WSE's bright newly redecorated Dining Room, by John P. Donovan, chairman of the Luncheon Committee. After extending a welcome to all those present, he called for support of the meetings and the use of the Luncheon Booklets in order to assure a more even attendance. This would allow, in turn, the procurement, because of larger attendance, of nationally prominent speakers.

Donovan then introduced various WSE members in attendance: Dr. R. S. Ziehn; George C. Harris; Past President Donald N. Becker; Vice President Philip

L. Coleman; Treasurer Ernest R. Hendrickson; Trustee Robert H. Bacon; and Lauren Asplund, chairman of the Membership Committee. Mr. Harris said a few words regarding the Paper and Speaker Group of the Western Society, and Mr. Asplund spoke regarding plans of the Membership Committee.

Howard A. Carter, chairman of the Education and research Division, then was introduced. His Committee was co-sponsor with the Noon Luncheon Committee of the meeting. Mr. Carter explained the purpose of the Education and Research Division, then introduced the speaker, Dr. Barthel.

Dr. Barthel aimed his remarks toward an explanation of the significant advances in science in recent years, and gave his estimate of what is to come in the future of science and research.

ciation, Tenth National Conference. Detroit.

Oct. 21. WSE Noon Luncheon Meeting. 12:00 Noon. "Unique Construction Methods on the Union Dome at Wood River, Ill." Speaker, R. C. Ulm, manager of Product Research, Graver Tank & Mfg. Co. WSE Headquarters.

Oct. 22. The Chicago Lighting Institute. Lighting for Production. 140 S. Dearborn St., Chicago.

Oct. 22-23. Illinois Institute of Technology, 15th Annual Conference on Industrial Hydraulics. Hotel Sherman, Chicago.

Oct. 23. American Society of Civil Engineers. 12:00 Noon. "Operations of the Chicago Park District." Speaker, Ray Knapp, of the Chicago Park District. Chicago Engineers Club.

Oct. 26-30. Society of Photographic Scientists and Engineers. National Photo Science Conference. To hear reports from the Military. Chicago.

Oct. 27. WSE General Meeting and Dinner. WSE Headquarters.

Oct. 27-29. The American Society of Mechanical Engineers and American Institute of Mining, Metallurgical and Petroleum Engineers. Joint Solid Fuels Conference. Netherland-Hilton Hotel, Cincinnati.

Oct. 28. ASME Luncheon (no WSE Noon Luncheon Meeting) Contact Chicago Section for tickets.

Oct. 28-29. Armour Research Foundation, 6th Annual Computer Applications Symposium. Chicago.

Oct. 30. American Society of Civil Engineers. 12:00 Noon. "Zimmerman Process of Sewage Treatment." Speaker, Dr. Emanuel Hurwitz, of Metropolitan Sanitary District. Chicago Engineers Club.

Nov. 2. WSE Young Engineers' Forum. "Utilities." Speaker, Murray Joslin, vice president, Commonwealth Edison Co. WSE Headquarters.

Nov. 2-5. The Metallurgical Society of the AIME. Annual Fall Meeting as part of the National Metal Congress. Morrison Hotel, Chicago.

Nov. 4. WSE Noon Luncheon Meeting. 12:00 Noon. "Human Engineering." Speaker, S. L. Jewell, vice president, Peabody Coal Co. WSE Headquarters.

Nov. 4. Institute of Metals Division of the Metallurgical Society. Important unclassified atomic energy phases. Sixth Nuclear Metallurgy Symposium. Morrison Hotel, Chicago.

Propose West Suburban Chapter

The Program Committee along with the Membership Committee of the Western Society, cognizant of an interest in forming a West Suburban Chapter of WSE, have proposed that a series of meetings be scheduled at locations in the Western Suburbs under their sponsorship. During this series it should be possible to determine the extent of interest in meetings held there, the increase in WSE membership that may accrue, and also to determine that there will be no effect on the regular meetings at WSE Headquarters.

If the interest shown in these four monthly meetings is sufficient to justify the formation of a West Suburban Section of WSE, such a group might then formally petition the Western Society for

section status on a geographic basis rather than technical basis.

The first dinner meeting will be held at 6:30 p.m., Wednesday evening, October 14th, at Remick's Lilac Lodge, 22nd and Wolf road, in Hillside, and will be sponsored by the Hydraulic, Sanitary & Municipal Engineering Section.

Mr. Horace P. Raney, consulting engineer and former assistant chief engineer of the Chicago Metropolitan Sanitary District, will talk on the Great Lakes water diversion project. Frank M. Scott, WSE trustee, will discuss the aspects of Western Society's interest in West Suburban meetings. All Western Society members and interested guests are invited to attend this first meeting.

Calendar of Engineering Events

Oct. 11-16. American Institute of Electrical Engineers, Fall General Meeting. Morrison Hotel, Chicago.

Oct. 12-14. Fifteenth Annual National Electronics Conference. Hotel Sherman, Chicago.

Oct. 12-14. National Electronics Conference, Annual Electronics Conference. Hotel Sherman, Chicago.

Oct. 14. WSE Noon Luncheon Meeting, 12:00 noon. "Chicago's Future as a World Seaport." Speaker, James J. Pisco, chief engineer, Regional Port Dis-

trict. WSE Headquarters.

Oct. 16. American Society of Civil Engineers. 12:00 Noon. "Economic Development of the Middle East." Speaker, Saadat Hasan, director of the Arab Information Center, Chicago. Chicago Engineers Club.

Oct. 19. WSE Young Engineers' Forum, "Heavy Engineering." Speaker, Merton M. York, manager, North Central Region, Allis-Chalmers Manufacturing Co. WSE Headquarters.

Oct. 20-22. American Standards Asso-

Combined Efforts Meet Power Need

A meeting of the American Institute of Electrical Engineers (AIEE) was told on April 8 in Atlanta, Ga. how the federal government and a private power company combined efforts to meet the "extraordinary" electric power needs of the nation's missile testing installations in Florida.

Speaking at the Dinkler Plaza Hotel during the AIEE Southeast and South Central District Meeting, James J. Barry of Smith and Gillespie, Jacksonville, Fla., reported that an unforeseen and unprecedented growth of facilities at Cape Canaveral Missile Test Annex since 1952 "played havoc" with all power load forecasts. As a result of cooperative effort between the Florida Light and Power Company and the government, he said, it is now believed "that a realistic estimate of the situation has been obtained and that the needs of this installation will be satisfied for a reasonable length of time."

"To illustrate . . . how far present (power) requirements have gone beyond those anticipated," he said, "one installation alone which was placed on the line in 1957 created a demand within just a few hundred kilowatts of the total demand anticipated for the entire base five short years ago."

. . . At present, the total power requirements are approximately double the amount estimated in 1952 and further growth is anticipated."

Burgeoning Requirements

The Florida Power and Light Company has been working closely with the government to meet these burgeoning requirements, he said. Because of the size of these needs, he reported, it has been necessary to separate power into two types of services—industrial and critical. The first is defined as power which serves normal residential, commercial and industrial type loads; the second is that power required by installations of a technical nature which require special consideration as to voltage and frequency regulation and extraordinary continuity of service.

A Cape Power Plant was constructed to meet the critical needs. The Critical System as such, exists only during operations involving missile or instrumentation testing. When operations of this

nature are not in progress the Cape Power Plant is placed on a stand-by basis; The Critical Distribution System is connected to the Industrial System and all of the power requirements are supplied from the Industrial Power source which is fed by the Florida Power and Light Company. Present estimates for the current program are approximately 20,000 kva and 5,000 kva for the Industrial and Critical systems respectively.

"While the development of missiles is

continuing and will continue well into the future," he said, "a lot more information was available than five years previously. All concerned now believe that a realistic estimate of the situation has been obtained and that the needs of this installation will be satisfied for a reasonable length of time. On this basis, both the Florida Power and Light Company and the Government have implemented the programs necessary to meet these requirements."

New Thermoelectric Generator

A contract to build a 5,000 watt thermoelectric generator has been awarded to Carrier Corporation by the U.S. Navy Bureau of Ships, it was announced in Washington, D.C. earlier this year.

The unit will be 15 to 20 times more powerful than experimental devices developed to date. Fabrication began immediately and it will be in full operation within a year.

"Because it is potentially noiseless and vibration-free, this could become a vital element in our defense programs," said Dr. J. F. Downie Smith, vice president in charge of Carrier's central Research and Development Division. "Thermoelectric generators have no moving parts

and therefore are more difficult to detect."

The unit will transform heat directly into electricity. Conventional electromagnetic systems require boilers, turbines and generators or other prime movers such as water power plus a generator.

Basic principles of thermoelectricity have been known for more than a century. But only recently have improved designs and new materials called semiconductors made this remarkable source of electric power practical outside the laboratory.

Looking beyond use of the generator by the Bureau of Ships, Dr. Smith said: "In the future these devices will have

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a wide variety of uses. Thermoelectricity is an obvious source of power in those parts of the world where conventional methods are not feasible. This technique can also be used for radio transmission and reception in areas where no current is available and when batteries are impractical."

Power from Waste Heat

Pointing out that only heat is required to produce electricity, Dr. Smith noted that these unique generators could be powered by natural heat from the sun or even heat escaping from industrial chimney stacks, which currently is wasted.

"Thermoelectric generators in the foreseeable future will provide standby emergency service when other power equipment is out of order. This applies to smaller units for residences as well as larger sizes for commercial power plants. During the next decade their capacity undoubtedly will be greatly increased," he added.

The Research and Development Division of Carrier Corporation has conducted and sponsored basic research in this field for some years. As the world's leading manufacturer of air conditioning equipment, Carrier is also engaged in studies of similar thermoelectric mechanisms which transform electricity directly into heating or cooling, again without any moving parts.

Sintering Plant in Operation

A sintering plant for the beneficiation of iron ore fines has been placed in service at U. S. Steel's South Works, Charles J. Hunter, general superintendent, announced earlier this year.

The 5,000-ton per day plant has been under construction for about two years. It is located within the plant area northeast of the main office, 3426 East 89th st.

Mixed with coke, fine powdered ore is fed through the sintering plant where the ore is fused by heat into clinker-like chunks. The process provides uniform size ore which increases the efficiency of blast furnaces and boosts their iron-making capacity.

The ore utilized to make sinter is too fine to be introduced economically into blast furnaces without such processing, since most of it would be lost in the form of dust from the stacks.

The huge, rambling plant consists principally of four parts: a continuous traveling sintering grate 168 ft. long and 8 ft wide; a special gas-fired furnace to ignite the fuel contained in the mixture of iron and coke breeze; a series of wind boxes to accelerate the fusing of iron particles; and fans with a total capacity of 390,000 cubic ft. per minute.

Other handling equipment includes 8,570 ft. of heavy duty conveyor belts for transporting materials, and a cooler

conveyor where material passing under cooling hoods is reduced from a temperature of 1,100 degrees Fahrenheit to about 250 degrees in a distance of 300 ft.

One of the spectacular sights at the sintering plant is the giant "flying saucers," 18-foot rotating discs which mix the fine powdered ore and form it into small pellets prior to sintering.

The plant was designed and built by the Dwight-Lloyd Division of the McDowell Company, Inc. of Cleveland.

It is designed with the latest in dust collecting equipment employing a mechanical-electrostatic dust collector with 416,000 cubic feet per minute capacity.

Sulfuric Acid Plant

Leonard Construction Company of Chicago announced on Aug. 3 their receiving the contract award for engineering and construction of a three-quarter-million dollar contact sulfuric acid plant at Cairo, Ohio, for the American Agricultural Chemical Company.

The plant will use elemental sulfur as a raw material and will use Monsanto Chemical Company vanadium sulfuric acid catalyst.

Construction will begin immediately, Leonard said, with completion scheduled for March, 1960.

CIVIC COMMITTEE MEETING

Wednesday, October 21

WSE Dining Room

Social Hour 5:30

Dinner 6:15

Meeting 7:00

Speaker: MR. CLAIR RODDEWIG
President of the Association of Western Railroads, President of the Chicago Plan Commission, Former President of the Chicago and Eastern Illinois Railroad.

**WSE MEMBERS AND GUESTS
ARE INVITED TO ATTEND**

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Automatic Dispatch System Installed

Commonwealth Edison Company has installed an automatic dispatch system which exactly regulates production in ten generating stations to meet the demand of its two million customers in the Chicago area.

Willis Gale, chairman of Commonwealth, announced that the new electronic control equipment has been placed in regular service. The equipment was built by General Electric Company. The cost, including installation expense, approximated \$700,000.

"The device not only regulates electricity output to match demand," said Mr. Gale, "it also selects which of 37 turbine generators can most economically produce additional electricity as required.

"Conversely, when the demand is decreasing the device selects the turbine generators producing electricity at the highest cost and reduces the output of those units."

In Downtown Chicago

The central portion of the installation, which is among the first of its kind in the country, is located in the utility's power supply control room in the Edison building in downtown Chicago.

This equipment continually determines the increment amount of generation needed and instantly translates it into a cost of power bid. This bid is transmitted to the generating stations where similar control equipment assigns the load to units which can produce power at this cost.

The computer determines which turbine generators can carry a given electrical load most economically on the basis of several variable factors, such as the efficiency of the individual units, fuel cost and transmission cost to the point of use.

A total of 37 generating units, some of which are as far away as 140 miles, are tied in with the new control system. These units are at four generating stations in Chicago; the Joliet and Waukegan Stations; Ridgeland Station at Stickney; Will County Station near Lemont; State Line Station at Hammond and Powerton Station near Pekin.

The 37 units have aggregate net generating capability of 4,634,000 kilowatts, or approximately 92 per cent of the total capacity of the Edison system.

The device will be valuable not only in assuring the most efficient use of Edison power production facilities but will also maintain proper flows on interchange of power between Edison and the other utilities.

This latter factor is important because Edison is part of a huge power pool in the east central part of the United States. Smooth operation of the pool requires that each of the interconnected utilities

be responsible for its own requirements.

Customer demand for electricity is continually changing and no minute of the day is precisely like the minute before.

The load on the Edison system can and does vary from one minute to the next by as much as 50,000 kilowatts—or the equivalent of the amount of electricity used by the customers in a community of 80,000 population.

Contract for Polyphenyl Ether

Monsanto Chemical Company has signed a contract with the Materials Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, to supply a research quantity of a polyphenyl ether for testing as a high temperature functional fluid, Howard K. Nason, Monsanto vice president and general manager of the company's Research and Engineering Division, announced in St. Louis.

The material will be produced by the division's research department at Dayton, Ohio, Nason said.

The polyphenyl ether to be supplied is one of a series of such compounds

developed for the Air Force by Monsanto for possible use as thermally stable lubricants, hydraulic fluids, and greases. Responsible for the development were Drs. E. S. Blake, W. C. Hammann, J. W. Edwards and Mr. T. E. Reichard, all of Monsanto's Research and Engineering Division.

In announcing the development last year, WADC said the new fluids remain liquid and retain lubrication characteristics at temperatures ranging from 20 to 800 degrees Fahrenheit. They also were described as being two to five times more stable under nuclear radiation than existing organic lubricants.

Let's Take A Trip Where Shall We Go?

Your Excursion Committee would like your help in planning future tours.

Please tell us where you would like to go or what you would like to see and if it is possible, a tour will be arranged.

If your company has a new plant or a new process that you think the membership of WSE would be interested in seeing, please contact the committee.

Call Don Worcester, MOhawk 4-7200, Ext. 609.



News
of
Engineers

or: Personals
of
Personable People

V. E. Gunlock, MWSE, chairman and member of Chicago Transit Board, was unanimously re-elected chairman of the Transit Board on Sept. 3 for a term of three years. This action by the Board follows Chicago's Mayor Daley's re-appointment of Mr. Gunlock for a seven-year term as a member of the Transit Board.

Board members elect their own chairman. Mr. Gunlock has served two terms as chairman of the Board, his second term as chairman expiring on September 1. Mr. Gunlock has been a member and chairman of the Board since mid-year 1954.

George D. Bellows has been elected a vice president of the Paul Weir Company, Inc., consulting mining engineers with principal offices in Chicago.

During the past two years, Mr. Bellows has been in charge of the Ferrous and Non-Ferrous Mining Department of the Paul Weir Company's organization in Korea where the firm is a member of a consortium of engineering companies supplying technical assistance to the government of the Republic of Korea and to the United States Operations Mission to Korea, a branch of the International Cooperation Administration of the United States.

Prior to joining the Paul Weir Company, Bellows spent five years in Indonesia as mining consultant on the staff of the J. G. White Engineering Corporation and ten years in Bolivia as general manager of mines for W. R. Grace and Company.

Dr. Nicholas A. Weil, has been named director of mechanical engineering research at Armour Research Foundation of Illinois Institute of Technology, Chicago.

His appointment was announced by Dr. E. H. Schulz, vice president for research operations at the Foundation.

Most recently Weil had been chief development engineer for the M. W.

Kellogg Company, where he had been an employee since 1952. Previously he was a research assistant in structural mechanics at the University of Illinois.

In his new position he will direct areas of research and development in stress and structural analysis, automation, materials engineering and dynamics and vibrations.

As an author and co-author of numerous technical papers and books, Weil has covered the fields of stress analysis, material properties, metal forming techniques, fluidization and dust entrainment conditions. He has been issued two patents and has five patent applications pending.

Weil received his M.S. degree in structural engineering and his doctorate at the University of Illinois. He earned his bachelor's degree at the University of Budapest.

At present he is a reviewer for the Journal of Applied Mechanics, the National Academy of Sciences and the

Pressure Vessel Research Committee, and is a member of the code committees of the American Standards Association and the American Society of Mechanical Engineers.

Weil holds memberships in the American Society of Mechanical Engineers, Society of Sigma Xi, Pi Mu Epsilon and Gamma Alpha. He is a member and past secretary of the Kellogg branch of the Scientific Research Society of America and an associate member of the American Society of Chemical Engineers.

To further its studies of the basic question of what is the nature of matter, the Argonne National Laboratory, Lemont, Ill., has announced the formation of two new major scientific divisions—High Energy Physics and Solid State Science.

Acting Director of the High Energy Physics Division will be Dr. Roger Hildebrand, who is also associate lab-

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oratory director for High Energy Physics. Director of the Solid State Science Division will be Dr. Oliver C. Simpson, formerly associate director of the Laboratory's Chemistry Division.

Coinciding with Dr. Simpson's appointment, Dr. Donald C. Stewart has been named Associate Director of the Chemistry Division.

The Argonne National Laboratory is operated by the University of Chicago under contract to the U.S. Atomic Energy Commission. One of America's leading atomic energy research and development centers, the Laboratory is located 25 miles southwest of downtown Chicago.

Argonne's Director Dr. Norman Hilberry announced establishment of the two divisions. He said, "The new divisions will allow us to coordinate and emphasize studies of some of the most fascinating and ultimately useful properties of matter. Both will use sub-atomic particles as probes to determine new facts about the world around us."

D. S. Walker, Vice President and Director of Sales for Combustion Engineering, Inc., has announced the appointment of Vincent P. Owens as Assistant General Sales Manager in charge of Industrial Products. For the past ten years Mr. Owens has been Manager of Paper Mill Equipment Sales. He will continue to supervise the Company's Paper Mill Division sales in addition to sales of Industrial Steam Generators, Raymond Division equipment and Fabricated Products. Owens has been continuously active in paper mill circles since joining the Combustion organization in 1936.

Dr. L. F. Yntema is now acting as consultant at Bjorksten Research Laboratories, Madison, Wis., on research and development of foamed metals. Formerly Vice President, Director of Research of Fansteel Metallurgical Corporation and Senior Metallurgist at Stanford Research Institute, Dr. Yntema has an illustrious background in the fields of Inorganic and Electrochemistry, Rare Earths and Refractory Metals. He holds many patents in these fields.

Dr. Stanley A. Dunn, formerly of Rhodia, Inc., has also joined the laboratory to supervise projects involving im-

proved materials using high temperature and high pressure techniques.

Other recent additions to the expanding technical staff of Bjorksten Laboratories at Madison, Wis., are Messrs. Edward J. Rock, Jr., Vernon K. Rising, Gordon Jensen, Arnold Flagel, Darrell Lien, Melvin Blahnik and Arthur Sincere. Mr. Joel N. Lipscomb and Miss Catherine J. McGough have recently joined the staff of Bjorksten Texas Research Co. at Houston, Texas.

The appointment of Leon C. Koenig as vice president of manufacturing was announced by Lindberg Engineering Company, Chicago.

Koenig, a company founder, has been assistant secretary and plant manager. Lindberg manufactures industrial heat treating and process line equipment and began operation in 1935.

William L. Baker, Jr. has joined the Chicago sales office of The Trane Company as a sales specialist on packaged air conditioning and heating products, A. C. Menke, Trane Vice President, Heating and Air Conditioning Sales, has announced. Baker will handle sales and dealer contact for Trane packaged units going into residences, offices and small commercial installations.

Trane is a leading manufacturer of air conditioning, heating, ventilating and heat transfer equipment with home offices in La Crosse, Wisconsin.

Baker joins Trane with eight years experience in the air conditioning field. He recently completed an orientation-training program at La Crosse.

After attending Southern Methodist University, Baker served in the Navy during World War II.

Brochures Guide Young Engineers

Three new brochures to guide young engineers during their first few years after graduation have been announced by the Training Committee of the Engineers' Council for Professional Development.

This new literature is published in support of the FIRST FIVE YEARS program of ECPD. It is designed to assist the young engineer in the critical early years of the post-graduate period when he will be finding his place in professional practice and will be endeavoring to establish his own professional goals.

"Your First Five Years," the first brochure, outlines the challenge to the young graduate embarking upon an engineering career, cites several guiding principles, and suggests a six-point professional development program consisting of the following: 1. Orientation and Training in Practice, 2. Continuing Education, 3. Professional Identification, 4. Responsible Citizenship, 5. Selected Reading, and 6. Personal Appraisal. Price: 10 cents.

"Selected Reading for Young Engineers," the second item, has a preface which points out that: "Two of the most important attributes the successful engineer must possess are first, the ability to deal with men and affairs, and second, the ability to read and absorb the written experience of others." This brochure contains a recommended reading list with suggestions in the fields of biography, travel, history, economics and sociology, psychology, philosophy, natural sciences, and general literature.

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"Personal Appraisal" Questionnaire is the third new publication. It is designed to aid the young engineer in evaluating his progress periodically so that he may effectively plan his steps in future professional development. This appraisal form identifies the many personal qualifi-

cations necessary and the numerous professional standards to which a young engineer must adhere, if he is to achieve high standing in his chosen profession. Price: 10 cents each.

All of these new publications are available as separate items or will be furnished with each purchase of the basic reference manual, "A Professional Guide

for Young Engineers." This professional Guide contains "The Second Mile" papers of William E. Wickenden, and also includes a statement of the "Canons of Ethics for Engineers," and the "Faith of the Engineer." Total cost of the Guide and brochures is \$1.00. Write ECPD, 29 West 39th Street, New York 18, New York.

Lens Corrected for All Colors of Light

A "superchromat" lens, the first ever to be corrected for all colors of visible light, is promised by an improved optical formula devised by Dr. Max Herzberger of Kodak Research Laboratories.

A three-element lens, made with three glasses chosen from a graph based on the new formula, is corrected for light from the ultraviolet to the infrared, or from 365 to 1,010 millimicrons.

Current lenses represent a compromise, the scientist explained, since correction for two colors may cause chromatic aberration for the other colors in the spectrum. In a camera this would mean that images of differently colored objects photographed in the same position would fall in slightly different places on the film.

Previously, with special glasses called "short flints," it has been possible to correct some triple-element lenses for three colors only. These lenses are known as apochromats. The use of fluorite in microscope lenses has been still more beneficial. But fluorite changes its refractive index with temperature and does not easily lend itself to long focal length lenses.

Dr. Herzberger discovered that a great number of glasses can be found which permit design of a unit of three lenses which he calls a "superchromat." With this type of lens, images of all colors are in perfect register.

Kodak scientists have already designed telescope objectives with a "superchromat." They are now working on its use for corrected camera lenses and infrared optical systems.

Dr. Herzberger's new optical formula differs from usual dispersion formulae because it is linear. This makes calculation of values much easier for lens designers, and permits less involved use of machines such as computers in lens design problems, he said.

The dispersion formula depends upon

four data for a given kind of glass. Given these constants, refractive indices for any wavelength of light can be computed. Two of these data, plotted against each other, give the curve from which the glasses for a "superchromat" are chosen. If optical characteristics of any

three glasses fall in a straight line on this graph, they will form a "superchromat" when correctly combined in a lens.

A detailed report of Dr. Herzberger's work will appear soon in the scientific journal, "Optica Acta."

ASME Takes Step toward "Unity"

A concrete step toward "unity of the engineering profession" was disclosed recently by The American Society of Mechanical Engineers. In the future, members of 21 sister engineering societies, including the Western Society of Engineers, will enjoy the privilege of attending general meetings of ASME without registration fee. At conferences sponsored by any of ASME's Professional Divisions, they will pay the same fee as that charged ASME members, usually one half the non-member rate.

The 21 groups are those represented on Engineers Joint Council or Engineers' Council for Professional Development, organizations dealing with matters of profession-wide interest.

A statement by Glenn B. Warren, president of ASME, which accompanied the announcement said:

"We hope that, by taking this initial step, ASME is helping to demonstrate the community of interests shared by all engineers and is helping to lead the way toward greater liaison at the working level. Clearly, many of ASME's national meetings are of interest to members of our sister groups. We hope that the adjustment of registration fees will encourage them to share in the benefits of these meetings and conferences. Although this step may result in some loss of income to ASME we are confident that dollars spent in this way will pay dividends for the entire profession."

Members of the Institution of Mechanical Engineers of Great Britain, and the American Rocket Society continue to be eligible for the same privileges under previously announced reciprocal agreements with ASME.

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Reviews of Technical Books



Engineering Manual

Engineering Manual, by John H. Perry and Robert H. Perry, published by McGraw-Hill Book Company Inc., New York 36, N.Y. First edition 1959. Price \$9.50.

This manual presents in individual sections the commonly used formulas, data, and methods in the principal engineering fields. Architectural, chemical, civil, electrical, mechanical, and nuclear engineering specialists have drawn from extensive backgrounds within their own fields to compile that information most often required in the daily application of their profession. In addition, there are three introductory sections covering data common to all engineering computations.

The need for such a volume is fairly obvious since the engineer, regardless of his specialty, finds it difficult to insulate himself from the rest of the engineering profession. For instance, the chemical engineer, charged with process responsibility for a new plant, cannot divorce himself from frequent consideration of areas normally assigned to mechanical, electrical, civil, or architectural engineers for detailed design.

The manual is useful in that it eliminates the necessity of referring to several different text books in case some information is desired in any of the subjects presented. Some subjects are presented in more than one section, but an extensive system of reference and cross reference makes the use of the manual less time consuming than might be expected.

The manual is recommended for those engineers who are preparing for professional engineer license examination since some degree of competence across the entire field of engineering is required of the applicant.

H. H.

Structural Design

Structural Design for Dynamic Loads, by C. H. Norris, R. J. Hansen, M. J. Holley, Jr., J. M. Biggs, Saul Namyat, all professors of structural engineering at Massachusetts Institute of Technology,

and Prof. J. K. Minami of University of Tokyo. Published by McGraw-Hill Book Company, Inc., New York 36, N.Y. First edition 1959, Pages, 450, Price, \$12.50.

Most of the civil engineering structures are designed to carry their own dead weight plus a superimposed live load which is dynamic in nature. The analysis of these structures then should employ the principles of dynamics. However, in many cases experience has shown that the dynamic effects make a minor contribution to the total load which must be provided for in the design. Therefore the practice has been to replace these dynamic effects with an equivalent static load and design the structures according to principles of statics.

In recent years there have been a number of developments which have led to a growing interest in a more precise evaluation of effects produced by the dynamic portion of the loading. Among these are the imposition of more severe live loading conditions (that is, heavier machinery and vehicles running at higher speeds), the construction of higher towers and longer bridges involving important live loading conditions, the necessity of developing blast proof construction (mainly to resist nuclear explosions), and a desire to improve earthquake resistant construction.

In summer of 1956, the Structural Division of the Department of Civil Engineering at the Massachusetts Institute of Technology offered a two week special summer program on structural design on dynamic loads. This book has been compiled from the lecture notes and is intended for the structural engineers who are interested in improving their competence in this area. The book is not intended as a text book or a reference book covering the subject. It is rather intended as a survey of the field of structural design for dynamic loading and as a guide to the engineer who is studying in this area. As might be expected, the book is highly theoretical in nature and further studies for more detailed information is definitely recommended. A

plenty of reference sources are included at the end of each chapter. The 20 chapters are divided into four main parts.

Part 1. Behavior of Materials under Dynamic Loading. This part includes both steel and reinforced concrete structures.

Part 2. Calculation of Response of Structural Systems to Dynamic Loadings. Theoretical methods of analysis and design and their limitations are discussed in this part. Some simplified methods are also presented.

Part 3. Modern Computational Techniques Applicable to Response Calculations. This part presents the use of numerical methods and digital computers in carrying through many practical response calculations.

Part 4. Application of Structural Design and Analysis to Special Cases Involving Dynamic Loading. This part discusses the design of blast resistant structures. The material presented is a condensation of portions of a design manual prepared for the Office of Chief of Engineers, U.S. Army. The remainder of the part discusses the current thinking on earthquake resistant design, the vibration of bridge girders under moving traffic loads, and the dynamic effect of wind load.

H. H.

Reinforced Concrete

Reinforced Concrete Fundamentals, by Phil M. Ferguson, John Wiley & Sons, Inc., New York 16, N.Y., 1958, Pages, 604, Price, \$9.50.

This is a new introduction to the subject centered primarily on theory. It emphasizes the ultimate strength theory and the manner in which beams and members fail under overload. The physical behavior of reinforced concrete members is another major consideration throughout the text. Despite its concentration on these areas, the author retains an adequate coverage of working stress methods, describing them in detail and comparing them at length with ultimate strength analysis.

Even in Chicago the Wind Was Licked

The problem was how to keep the more than 200-mile-per-hour rear wind blasts of jet engines from wreaking havoc at airports in Chicago and throughout the nation.

The solution? A veteran Chicago industrial firm and an internationally known aircraft manufacturer joined forces to lick this, one of the great safety problems brought on by the advent of the jet age.

The companies involved are the Blackstone Manufacturing Co., Inc. of Chicago and the Boeing Airplane Company, developer of the famed Boeing-707 jet.

The big Boeing 707s, for example, have been known to send baggage carts, workers' lunch pails, umbrellas, or hundreds of other things normally found near an airport runway, rocketing about as if in the teeth of a hurricane.

The solution, according to Leon H. Gray, executive vice-president of Blackstone, is the Boeing-Blackstone Vane Type Air Deflecting Fence, a louver type blast fence patented by Boeing and manufactured by Blackstone. The fence has already been pronounced superior to other types by such authoritative bodies as CAA, CAB, U.S. Air Force and the Port of New York Authority. The Air Force is literally using thousands of feet of the fence.

It was sometime after World War II that it was decided something should

be done about the need for a safe, fool-proof blast fence. In 1951, Boeing and Blackstone decided to work together on this project.

The two companies were well-known to one another, as Blackstone had furnished Boeing with intricate parts during the war. A dynamic combined research program was launched, and the result was a fence that dissipates wind and noise, shooting smoke and debris straight up at an 85-90 degree angle, protecting many things that otherwise might be easily damaged. Another version was later developed retaining the vision so vital for maintenance of a landing strip; and nothing can be blown against and over the top of the fence!

Chicago's Municipal airport — the busiest in the world, according to recent figures—and O'Hare Field, have already approved the fence and are discussing installation.

According to S. L. Germain, in charge of fence sales for Blackstone, it is vital for airlines to have this type of fence in order to have jets come into or leave the terminal under their own power. Otherwise, he says, it would necessitate towing these giants before take-off or after landing.

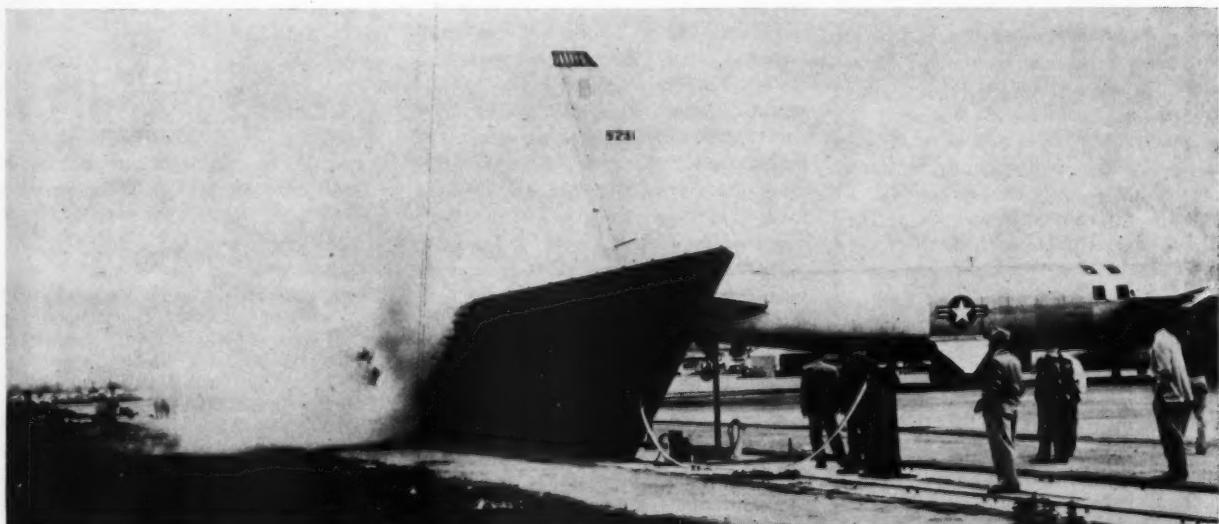
When the development of the fence was completed eight years ago, the crucial moment for the two companies took place one day at Boeing Field in Seattle,

Washington. High ranking Air Force officers stood by as B-52's lined up and blasted away at full rated power. Aside from a deafening roar, there was no other emphatic evidence of turbulence.

Leon H. Gray explains that fourteen models were developed and tested before the Boeing-Blackstone fence was finally wrapped up. The final model consisted of rigid, louvered curved steel vanes. The vanes are inclined toward the exhaust at an angle of 60 degrees from horizontal. Made in sections for easier installing, each section is approximately 10 feet wide, supported by steel columns.

The lower edge of the lowest louver is flat against the concrete base so no entrained debris flies between it and the ground to cut legs or tires on the far side. This lowermost louver receives the strongest blast, and in deflecting it upward, this portion of the blast acts like a curtain, allowing lighter vanes to be used above, thus helping to guide and confine the rest of the blast.

The blast fence is equally effective for many other purposes, according to Gray. For example, it can be used at airports and plane and engine-testing facilities; to protect planes and vehicles on adjacent taxiways from prop or jet blast during run-up and take-off; it protects traffic in adjacent streets or parking areas and nearby property from prop wash or jet blast.



The Boeing-Blackstone Vane Type Air Deflecting Fence in action shows how giant 200-mile-per-hour rear wind jet blasts

are deflected upwards. The vanes are inclined toward the exhaust at an angle of 60 degrees from horizontal.

New Products

As described by their Manufacturers

Standoffs and Spacers

Immediate delivery of standoffs and spacers, in six materials—metals, plastics, and ceramic—and in a wide variety of lengths and thread sizes can now be assured for almost any quantity, according to Amatom Electronic Hardware Co., Inc.

Amatom has developed an adequate stock of standoffs and spacers to guarantee substantial shipments without delay, and believes its inventory and range of sizes of this hardware is the largest in the country.

Round, Hexagon and Square styles are carried. Lengths run from $\frac{1}{8}$ " up to 10" (in increments of $\frac{1}{8}$ " in lengths up to 2"). Materials are Aluminum, Brass, Stainless Steel, Ceramic, Nylon and other Plastic. Stock sizes are $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " diameter; round, hex, and square. Thread sizes are 0-80, 2-56, 4-40, 6-32 and 8-32. Tolerances on length are plus .000; minus .005.

Lengths up to 1" are drilled and tapped through. Over 1" are drilled and tapped from each end.

Brass parts are stocked cadmium plated but are available in nickel or other finish. Stainless Steel parts are passivated. Aluminum parts are plain finish, but can be clear or black anodized to meet specification.

The Amatom company states that inquiries for any special standoff or spacer, either regular or swage type, are always welcome.

Samples of spacers and standoffs and 72-page catalog of Electronic Hardware, available on letterhead request to Amatom Electronic Hardware Co., Inc., 88 Drake Ave., New Rochelle, N. Y.

Circular Slide Rule

General Industrial Co. has started production on a handy Circular Slide Rule for engineers and for other plant and office executives. Any executive who must perform simple calculations will find this convenient, pocket-size calculator extremely useful in his work.

Operation of the rule is simple and the results are accurate. To multiply, divide and find proportions is easy and exceptionally fast with this convenient

circular rule. Complete easy-to-follow instructions will be included with each slide rule.

For your free Circular Slide Rule write on your business letterhead to



General Industrial Co., 1788J Montrose Ave., Chicago 13, Ill. and be sure to mention the name of this magazine.

Miniaturized Motor

An exclusive miniaturized induction motor with all the features of an ultra-modern power motor for use in tape recorders, communication equipment, office machines, turn tables, movie projectors, air craft, instruments, electronic devices and other applications is now available from Howard Industries, Racine, Wisconsin.

The new motor, Howard Model 9200, features specially designed magnetic and electric circuits (24/20 slots), sinusoidally distributed windings and internal rotor slotting, resulting in exceptionally quiet operation, low level magnetic hum, reduced external magnetic field, low temperature rise and minimum cogging and hunting.

Its frame size is $2\frac{7}{8}$ " x $2\frac{7}{8}$ " with overall length of 4 $1\frac{1}{3}$ " for frame 9210 and 4 $13\frac{1}{3}$ " for frame 9214. The 9200 is a permanent split capacitor, single phase, 50/60 cycle motor available in induction, torque and synchronous types. It is also available in two or three phase designs. Horsepower ratings are from 1/300 to 1/30 h.p.

Performance ratings of the various types of 9200 motor are comparable to those of motors with considerably larger frame sizes.

The motor has open, self-ventilated construction and is designed to allow six different types of mounting.

Bearings are porous bronze sleeve type, either self-aligning or rigid as required. Permanently lubricated sealed or shielded ball bearings can also be supplied.

Windings are heavy formex insulated magnet wire thoroughly impregnated and baked with a high grade oil and water resisting electrical varnish. Rotors are specially designed for uniform torque characteristics.

A unique air circuit design provides extremely efficient cooling of motor windings and bearings, resulting in extra long motor life with practically no attendance or maintenance.

For further information contact Howard Industries, Inc., 1760 State St., Racine, Wisconsin.

Literature

Machine Parts

A helpful new 24-page booklet entitled "How to Make Your Own Machine

When Construction begins on the Moon...



CONSTRUCTION on the moon! This idea made headlines recently—and who is to say "Not possible..."

So, since SOILTEST engineering testing equipment is now being used on Arctic icecaps, desert wastelands, steaming jungles, as well as in the most up to date university and professional testing laboratories in 105 countries around the world, it follows that when construction begins on the moon, moon soil samples will be tested first on SOILTEST apparatus.

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and Repair Parts Quicker and Easier" has been published by La Salle Steel Company.

The booklet is designed especially to help solve maintenance and repair part problems and is available on request, free of charge. It covers care and trouble-shooting of machines and equipment, machining and welding techniques and contains drill hole tolerances and a grinding limits chart.

Many types of parts are almost universal in their use throughout industry and the booklet pictures a number of these with descriptive case histories which discuss the benefits the user has obtained by using STRESSPROOF, a high strength all-purpose steel bar. It also discusses pertinent machining problems and time and labor costs saved by using this material.

The information contained is based on a number of discussions with practical maintenance and repair people.

Free copies may be obtained by writing W. E. Schneider, La Salle Steel Company, P. O. Box 6800-A, Chicago 80, Illinois.

Louver-Fold Door

A new Louver-Fold door that controls light, ventilation and view by a system of adjustable vertical louvers is described in a fully-illustrated, 10-page, four-color brochure.

Manufactured by Consolidated General Products, Inc., the Louver-Fold door is designed for use as a folding door or room divider, and functions as an attractive louvered partition in the partial open position. The catalog presents the full range of woods, sizes, colors, stock and custom models that are available. Complete specifications and installation details are also provided for a variety of residential, commercial and institutional applications.

Copies of this brochure are available free on request from Consolidated General Products, Inc., P. O. Box 7425, Houston 8, Texas.

Aluminum Mill Products

A new Reynolds aluminum mill products brochure gives complete specifications for the hundreds of alloys and forms of aluminum available from the company.

Based on Reynolds long experience in making and fabricating aluminum, the brochure enables designers, engineers

and buyers to pinpoint specific properties and apply them accurately to the desired end use.

Starting with a description of the light metal's classic advantages over other materials, the 18 pages include alloy and temper designations, fatigue and shearing strengths, and various alloys available in foil, sheet and plate, wire, rod and bar, tubing and pipe, and extruded and structural shapes. Fabricating and finishing techniques are summarized.

A bibliography provides a guide to related literature and movies available from Reynolds.

Copies of "Reynolds Aluminum Mill Products" may be obtained by writing to Reynolds Metals Company, Dept. PRD-1, Box 2346, Richmond, Va.

Fliteclock Units

Three new special application timers, featuring split-second accuracy and ingenious "time-out" provisions for true elapsed time indications, are described in a new brochure just issued by the manufacturer, Sphinx-American Corporation, Floral Park, N. Y.

Known as "FLITECLOCK," the precision units serve as split-second timers, elapsed time recorders and accurate timepieces. Engineered to withstand rugged vibration and temperature tests, they meet the most exacting military and naval specifications. All have fully guaranteed 13-jewel, precision eight-day movements.

Elapsed time is recorded on two inner dials in minutes and hours. A special device permits stopping the elapsed time hands to allow for repairs, downtime, or other interruptions. When restored to use, cumulative lapsed time is retained, eliminating the need for resetting, or keeping a separate record of time segments.

Mounting details, hand, numeral and background markings, color treatments, etc., of these fine instruments are concisely presented, along with other special features.

Copies of the brochure are available from Sphinx-American Corporation, 44 Cherry Lane, Floral Park, N. Y.

Variable Speed Drives

A new eight-page, two-color bulletin, G-5812, describes the complete line of Reeves Variable-Speed Drives which provide precise, infinitely adjustable

output speeds from a constant rpm. motor source operating from standard in-plant a-c. circuits.

The bulletin includes mechanical construction features, condensed drive specifications, available speed variations and accessories for the Reeves Vari-Speed Motodrive, Motor Pulley and Variable-Speed Transmission.

Individual copies of Bulletin G-5812 are available by writing to Reeves Pulley Company, Division of Reliance Electric and Engineering company, Columbus, Indiana.

Phosnic Bronze

Phosnic Bronze, a high copper alloy that combines to an unusual degree high strength and high electrical and thermal conductivity is described in a new booklet published by Chase Brass & Copper Co., Incorporated.

The booklet entitled "Phosnic Bronze" describes completely the various forms, tempers, and properties of the alloy, as well as its composition and a number of typical uses. Also included are discussions of endurance strength, creep and relaxation resistance, stress-strain char-

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acteristics, electrical and thermal conductivity, corrosion resistance, workability, and heat treatment.

Tabular data describing Phosnic Bronze include physical properties, fabrication properties, mechanical properties, electrical and thermal properties, endurance data, and temperature coefficients of resistance. Comparisons between Phosnic Bronze and other alloys are made of wire softening characteristics, creep characteristics, and a number of other physical and electrical properties.

Copies of "Phosnic Bronze" are available from any Chase Brass & Copper Co. warehouse or sales office, or directly from Chase Brass & Copper Co., Waterbury 20, Conn.

Brazing Stainless Steels

Just released by Harper Electric Furnace Corporation, a new illustrated booklet, *How to Braze Stainless Steels*, discusses in detail four important aspects of the brazing process: a. characteristics of base and filler metals; b. brazing cycles; c. selecting and using gas atmospheres; d. construction and application of various types of furnaces.

The author, H. M. Webber, manager of process engineering for Harper, is a recognized authority on furnace brazing, sintering and protective atmospheres. Engaged in process and application engineering for 33 years, Webber has lectured widely and has written numerous articles on heat processes. His new booklet on brazing stainless steels is a significant contribution to industrial progress.

Copies are available, without charge, by writing Harper Electric Furnace Corporation, 39 River Street, Buffalo 2, N. Y.

Belting

Voss Belting & Specialty Company of Chicago has issued a comprehensive new catalog on VOSSTEX conveyor and power transmission belting. The VOSS-TEX line includes a complete selection of rubber, neoprene and Hycar belting for manufacturing and food processing equipment. Write to Voss Belting and Specialty Company, 5645 North Ravenswood Ave., Chicago 26, Ill.

Air Compressors

A new, four-color, 12-page bulletin describing Westinghouse Unit Type air compressors has been issued by the Le

A radio-controlled lawn mower will be marketed by a British firm in 1960, reports *Electronics*. The mower is powered by a one-third horsepower, 24-volt, battery-operated motor. It is remotely controlled by a two-switch miniature transmitter through a multistage receiver. Receiver range is up to one mile, while speed of the lawn mower is just under two miles per hour.

Roi Division, Milwaukee, Wis. The free bulletin, numbered SG-2, describes G single-stage, YS single-stage, and YC two-stage Westinghouse compressors ranging in size from $\frac{1}{2}$ to 15 hp. Available pressures are from 80 to 250 psi.

The bulletin uses halftones and cut-away photos to illustrate the three different models of compressors, which feature low oil level protection, enclosed crankcase, controlled pressure lubrication, and thermal overload protection.

Comprehensive specifications list CFM displacements, pressures, weights, dimensions, and RPM of the various models and sizes. Component parts and accessories are explained. A section of the bulletin is devoted to air receiver and auxiliary storage tank specifications and dimensions.

For your free copy of the SG-2 write to the Sales Promotion Department, Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wis.

Ni-Resist Ductile Irons

"Engineering Properties of Ni-Resist Ductile Irons"—a 28-page booklet con-

taining the full story of this unique, new cast metal that combines high strength and toughness with outstanding resistance to heat, wear and corrosion. Tables and graphs explain mechanical and physical properties, erosion and corrosion resistance, and high temperature strength. A special section points out numerous proven industrial applications of Ni-Resist ductile irons. For the booklet write Reader Service Dept., The International Nickel Co., Inc., 67 Wall Street, New York 5, N. Y.

Industrial Lighting

A new 16 page booklet on industrial lighting is available from Day-Brite Lighting Incorporated. Fixture cost comparisons, cost of lighting per square foot, and numerous installation photos are illustrated. Copies are available from Day-Brite Lighting, Inc., 6260 North Broadway, St. Louis 15, Mo.

Detection and Control

Operation of the Level-Tek level detection and control system is described in a four-page illustrated brochure published by Aeronautical and Instrument Division, Robertshaw-Fulton Controls Company.

The device indicates and controls a predetermined level in liquids, granular solids or solids of a bulky and massive nature. An electronically actuated relay operates built-in signal lamps and a snapswitch. The signal lamps indicate whether the material level is above or below the desired point. The snapswitch is used to operate remote warning devices or motor starters, valves or timing devices which may be used to maintain the desired levels.

The instrument has no moving parts

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within the bin or vessel. Present applications include level control of petroleum products, acids, sewage condensates, flour, grain, wood chips, plastic powders and pellets, lime and cement.

The brochure is available from Aeronautical and Instrument Division, Robertshaw-Fulton Controls Company, 401 North Manchester Blvd., Anaheim, Calif.

Temperature Monitor

A new bulletin describing the Kybernetes electronic Temperature Indicator Monitor (TIM) has been released by Hagan Chemicals & Controls, Inc., Pittsburgh.

In addition to operational features and specification data, Bulletin MSP-155 discusses switching, amplifying, off normal alarms, power supply and basic design parameters.

Utilizing an electronic self-balancing amplifier, an alarm comparator and a chopper stabilized power supply, the rack-mounted unit has a guaranteed accuracy of .5 per cent of full scale.

It continuously scans up to five thermocouple inputs per second, actuating an audio-visual alarm when temperatures drift above or below per-set safety limits. Scanning is not interrupted during readout on the temperature indicator.

The TIM has wide application in the petrochemical, power and steel industries.

For copies of MSP-155, write Kybernetes Division, Hagan Chemicals & Controls, Inc., Box 1346, Pittsburgh 30, Pennsylvania.

Items for Soils, Concrete

Thirty-two new catalog items for soils, concrete and asphalt are described in a New Products Bulletin now available from Soiltest, Inc., Chicago manufacturer of engineering test apparatus.

Included in this four-page bulletin are descriptions of the Right-A-Weigh Balance, the Basic Concrete Tester, a 200 ton Pile Loading Ram, a Concrete Air Indicator and Precision Air Entrainment Meters. Two books, Collin's *Land-slides in Clay* and Hough's *Basic Soils Engineering* are listed as well as the Harvard Miniature Compaction Apparatus, the Brunton Pocket Transit, a new compact Cement Briquette Tester and a Recording Unconfined Compression Tester.

A copy of New Products Bulletin may be obtained by writing Soiltest, Inc.,

The "jimmy," a short crowbar often used by burglars, was invented in the Middle Ages and got its name from burglars' apprentices, who were all called "James," says *American Machinist*. When a bright crook invented the handy tool, he named his new helper after his old one, and the name stuck.

4711 W. North Avenue, Chicago 39, Illinois, U.S.A.

Shovel-Cranes

"How to Get the Most Out of Shovel-Cranes With Torque Converters" is the title of a new 16-page booklet just issued by Link-Belt Speeder Corporation of Cedar Rapids, Iowa, manufacturer of power shovels and cranes.

Since the torque converter in shovel-crane applications is relatively new, the purpose of this illustrated booklet is to offer tips that will assist an operator in getting greater production with less effort from a machine equipped with an engine-converter combination. Prefacing the tips on operation and maintenance is an introductory explanation of what torque is and how it applies to shovel-cranes. Immediately following is a comparison of performance differences between torque converters and fluid couplings.

Written in non-technical language, its contents are basically fundamental and as such, this operator's handbook is gen-

erally applicable to other than just Link-Belt Speeder shovel-cranes.

Copies can be obtained from Link-Belt Speeder distributors or by writing direct to Link-Belt Speeder Corporation, Cedar Rapids, Iowa. Ask for Book 2740.

Bar and Tube Machinery

Medart bar and tube machinery is described and illustrated in a new booklet available from Blaw-Knox Company, Pittsburgh.

The 18-page, two-color literature highlights billet peeling and chipping, centerless turning, bar and tube straightening, stretch straightening, wire straightening and cutting, and roll grinding.

Twenty-eight pictures point up the advantages of this bar and tube machinery.

The bulletin — No. 2533-JJ58 — may be obtained by writing Foundry and Mill Machinery Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pa.

Testing Equipment

A "new-products" bulletin is now available which describes ten recently developed items that have been added to the line of testing apparatus manufactured and distributed by Soiltest, Inc., of Chicago, Illinois.

Included in the list of items are apparatus for concrete, soils and asphalt testing, as well as the Soiltest Beggs Deformeter for solving problems involved in the design of indeterminate structures.

For concrete testing are a portable tension-compression tester and the CT-600 moisture-humidity tester for masonry blocks.

Soil testing equipment includes the

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sand equivalent test set, the Levermatic Consolidation Apparatus, a British style Recording Unconfined Compression Tester, a Standard Liquid Limit Device and the 200 ton Loading Ram for performing bearing capacity tests under static loads. There are two items of equipment described for asphalt testing: the C-50 heated universal mixer, as well as a non-heated version of the same mixer; and the new fully automatic electro-hydraulic kneading compactor.

The brochure may be obtained by writing Soiltest, Inc., 4711 W. North Avenue, Chicago 39, Illinois.

Roof and Floor Systems

Ceco open-web steel joists, steel roof deck, and Cecor centering, for construction of light-weight, economical, and safe roof and floor systems are fully described in a new 28-page booklet #3001-0 and an accompanying Load Tables bulletin #3009-A (both A.I.A. File No. 13-G).

Booklet 3001-0 contains complete descriptions and diagrams of open-web steel joists, including Ceco's Series "S," "L," and "E/C." Series E/C are electro-channel joists having their top chord replaced by a hollow duct serving both as a structural member and an under-floor electrical distribution duct that allows wiring of outlets at any point along the joist. The booklet also contains information on Ceco's steel roof deck and Cecor centering used as permanent form material for concrete slabs over steel joists or beams. The booklet is complete with tables of available dimensions, allowable loading, complete specifications, and recommended handling and erecting procedures. The tabular data of Booklet 3001-0 is supplemented by the Load Tables Booklet #3009-A, which contains all needed data for architects and designers.

Copies are available on request from Ceco Steel Products Corporation, 5601 West 26th St., Chicago 50, Ill., or any of its local offices.

Fasteners

A full range of sizes and types in AN and MS fasteners are among the brand new items in the latest catalog published by Star Stainless Screw Company, 699 Union Blvd., Paterson 2, New Jersey.

More than seven thousand items and sizes in stainless steel fastenings are available from Star for immediate de-

The roof over the arena being built for the 1960 Winter Olympics at Squaw Valley, Calif., is suspended from cables slung over steel towers in much the same way as suspension bridges are supported, reports *Engineering News-Record*. The roof span is 300 feet—the length of a football field—and the stadium will seat 8,000.

capacities; die handling trucks, with capacities to 80,000 lbs.; and mobile cranes.

Within each category is listed complete specifications for all models, plus numerous photographs of various model types.

One section of the catalog is devoted to fork truck attachments, while another section illustrates and describes major truck components.

Finally, the literature details the company's special engineering service, which provides specialized truck design to meet specific handling requirements that cannot be performed with standard models.

Copies may be obtained from The Elwell-Parker Electric Company, 4205 St. Clair Avenue, Cleveland 3, Ohio.

Films

Paving Highways

"Paving Modern Concrete Highways" is a new 16mm color film now available on loan from Blaw-Knox Company, Construction Equipment, Pittsburgh.

The 800-foot long film depicts base laying; form setting; subgrading; cement and aggregate batching; paver, spreader, and finisher operation; form stripping; and shoulder widening. Case history reports provide background information.

Taken during paving operations of the John C. Peterson Construction Corporation section of the Illinois Toll Road, the film is available to engineers, contractors, and civic groups.

Number of the film is STF-107. It may be obtained by writing to: Sales Promotion Department, Construction Equipment, Blaw-Knox Company, Pittsburgh, Pa.

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"Chameleon" Satellites Are Predicted

Space satellites may soon lay claim to the chameleon's valuable ability of changing its color for protection.

The idea involves the application of a heat sensitive coating for satellite skins to control internal temperature while the vehicle is whirling through space.

Devised by Rudolf X. Meyer, a scientist in the Physical Research Laboratory at Space Technology Laboratories, Inc., Los Angeles, the coating will change color thereby controlling the heat absorption and radiation qualities of the satellite. The idea is based on the well-known phenomenon that light colors reflect heat while dark ones absorb it.

Meyer stated that by applying his new coating the temperature inside the vehicle's shell would automatically be kept uniform. As the temperature of the satellite increases, its skin would become light in color, thereby allowing more heat to be reflected into space. Should the payload's internal temperature take a downward turn, the skin would become dark in color, thereby absorbing more radiation.

According to Meyer, the coating can either take the form of a paint-like substance or a plastic applied in several layers. He stated that he found about 35 substances while carrying out preliminary research which have this "chameleon" ability at the required temperature level. For instance, one particular coating changes with increasing temperature from red to yellow. In the case of polymer compounds, use is made of the reversible transition from the sol state to the gel state as the temperature increases.

Pioneer I

The importance of protecting satellite payloads from temperature extremes was dramatically brought home to STL scientists during the flight of Pioneer I which traveled some 70,000 miles from the earth in October 1958. For that experiment they calculated conditions under which the satellite instruments had to operate and a fixed-temperature control paint pattern was applied. As a result, when the satellite went slightly off course, temperature conditions changed, no adjustment was possible and some of the instrumentation failed.

Had Meyer's coating been available when the Pioneer I satellite was con-

structed, it might still be in orbit and giving vital information today.

Meyer stated that such coatings have been used in the past to indicate temperature but never, to his knowledge, as a heat control device. Railroads made good use of such a coating on wheel bearings so that inspection of these trouble points could be speeded up. However, the substance only indicated the presence of heat rather than protecting against it.

While the first application of the invention will go to aid the U. S. effort in conquering space, little imagination is needed to think of the many uses such a substance could be put to here on earth.

Temperature control in homes, autos,

airplanes and a host of other such applications come readily to mind. It is not too fantastic to think of treating cloth with such a substance for far more comfortable clothing. Such mundane items as sunglasses with automatic light control and glass walls which would in effect have blinds built right into them are just a few of literally thousands of uses for such a substance.

Space Technology Laboratories, Inc., besides having systems engineering and technical direction for the Atlas, Titan, Thor, and Minuteman ballistic missile programs, has carried out a number of outer space programs for the National Aeronautics and Space Administration and the Advanced Research Projects Agency.

NEC Meets in Chicago on Oct. 12

The 15th National Electronics Conference will meet Oct. 12-14, 1959 at the Hotel Sherman, Chicago, according to Virgil H. Disney, president. The 1959 NEC will hold sessions in adaptive servomechanisms, antennas and propagation, audio, circuit theory, communications systems, computers, information theory, instrumentation and telemetry, masers, microminiaturization, microwaves, millimeter waves, parametric amplifiers, plasma research, radar and radio navigation, servomechanisms, signal matched filters, solid-state circuits and devices, space electronics, communication and navigation, television, transistors, and valve engineering.

The NEC is sponsored by the American Institute of Electrical Engineers,

Illinois Institute of Technology, Institute of Radio Engineers, Northwestern University, and University of Illinois. Participants include: Michigan, Michigan State, Notre Dame, Purdue, Wayne State and Wisconsin Universities, and the Society of Motion Picture and Television Engineers.

Rigid Steel Panels

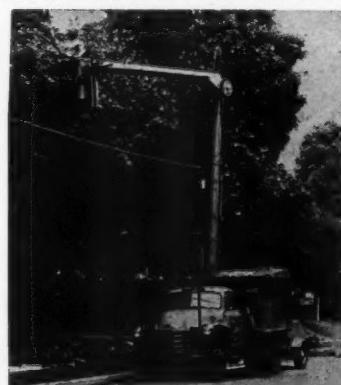
A German engineer, by imitating the structure of a butterfly's wing, has developed a light, highly rigid design for steel panels that has nearly 20 per cent more resistance to bending than similar designs, reports *Product Engineering*.

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100,000 Mile Mufflers Already Here

Passenger car mufflers with a 100,000-mile "lifetime" warranty, using processes first developed to protect jet engine parts, have been developed, tested, and submitted to the major auto makers for speedy introduction to America's harassed car owners, according to the Bettlinger Corporation, ceramic-on-metal specialists.

After years of extensive research designed to make ceramic-coated mufflers available at a practical cost for use on mass-produced automobiles, Bettlinger achieved a major breakthrough by the application of a newly devised coating process and allied production techniques.

The new mufflers cost no more than presently available premium-priced mufflers which, under best operating conditions, have less than half of the lifetime of the newly-developed type, according to Fred D. Shaw, Bettlinger vice president and general manager.

Refractory Coating

Bettlinger's application of a thin, corrosion-resistant refractory coating to low alloy steels has already doubled the life of thousands of "straight through" truck mufflers and has been verified by operating tests by truck motor manufacturers over the past seven years, Shaw revealed.

Extensive tests duplicating operating conditions of a full life-time of auto use, estimated to be 104,000 miles or 11 years by the American Automobile Association, have proved "very successful," according to Bettlinger's engineers. The new process for mufflers will solve one of the major part replacement headaches suffered by car owners.

A .003- to .004-inch thick integrated "skin" of the ceramic coating is fused at very high temperatures into the surface steel of the muffler. Impervious to shock, corrosion, and 1500° F. temperatures, the coating is fused onto both inside and outside muffler surfaces, and is equally applicable to tail pipes. Preliminary cost estimates indicate that the ceramic-coated muffler can be sold at prices economically possible for every car owner.

"The need for improved muffler materials is obvious," stated Mr. Shaw, who is vice president in charge of all Bett-

tinger research and development. "We have ample evidence that muffler life has been reduced by at least 50 per cent since the end of World War II.

"With dual mufflers on many cars, and as many as six on some 1960 models, the longer life will provide a real maintenance economy, as well as eliminating cost, inconvenience, and time required to replace a burned-out muffler or tail pipe."

Contributing Factors

Among the factors contributing to shortened muffler life are start-and-stop driving, higher compression engines, higher octane fuels, dual mufflers and the labyrinth designs required to cram effective cooling and noise suppression into smaller units to fit under low-slung American cars.

"Contrary to popular opinion, short-haul, stop-and-start at low speeds produces the most severe operating conditions for automobile mufflers," Mr. Shaw said. "Under these conditions, moisture containing corrosive materials collects on the inside of muffler and tail pipe and goes to work.

"Similarly, the dual muffler systems developed to handle the increased volume of gases from higher hp motors have created severe operating conditions for the muffler. As many car owners have found, the dual system has a 'cool' side and a 'hot' side. The cool muffler, which reaches the boiling point more slowly and less frequently, burns out rapidly."

Third Problem

American automobiles, with their acutely limited road clearance, have created a third problem. On old-fashioned round mufflers, the exhaust vapors travelled straight through, tending to be self-draining, or at least limiting the amount of condensate. The new designs, with their "tri-flow" tubes and "tuned chambers" to reduce noise levels, present more points where corrosion can take place.

The ceramic-coated metals used in Bettlinger's prototype mufflers have indicated equal ability to withstand not only the heat of the hot side exhaust, but also the corrosive action on the cool side of the exhaust.

Research in the field discloses the fact that approximately a gallon of corrosive

vapor passes through the muffler for each gallon of gasoline burned in the engine.

"We believe that ceramic-coated mufflers are by far the best solution to the problem," Mr. Shaw said. "The coatings we are now using appear suitable with minor redesign for most of the various mufflers used by the automobile manufacturers."

While replacement parts manufacturers enjoyed a constantly increasing market for replacement mufflers, consumer complaints to the car manufacturers have reached serious proportions. "Manufacturing divisions of the motor makers tell us that this is a major problem and that they must offer a more permanent muffler. When this revolutionary coated muffler is available on all cars, the American motorist will get a real mileage bonus out of his muffler and tail pipe," Mr. Shaw said in conclusion.

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Hydro Station Is Completely Automatic

Georgia Power Company's Oliver Dam hydro-electric station began operations in June, it was revealed in Atlanta, Ga. earlier this year at the joint meeting of the South East and South Central Districts of the American Institute of Electrical Engineers.

The dam, which is located on the Chattahoochee River near the city limits of Columbus, Ga., has an installed generating capacity of 60,000 kilowatts, with an annual generation of 255,000,000 kilowatt hours. The generating facilities are of the unit type construction and the plant is designed for completely automatic, remotely controlled operation. R. J. Kelly, of the Georgia Power Company said in a paper, Oliver Day Hydro Plant Electrical Design.

Oliver Dam, a so-called run of the river plant, is integrated with existing

dams at Bartletts Ferry and Goat Rock River upstream and the North Highlands down river.

The dam is of concrete with a spillway 1,324 feet long. It contains 33 radial gates, non-overflow sections approximately 499 feet long, and an intake section 198 feet long. The dam is approxi-

mately 80 feet high above the river bed.

The powerhouse has two floors, a generating room at an elevation of 286 feet and an outdoor deck over the generating floor at an elevation of 299 feet. The installed capacity of the powerhouse will be 84,700 hp from three turbines of 25,400 hp and one of 8,500 hp.

Red Men Never Had It As Good

Smoke signals have been familiar to fighting men since the days of the Indian Wars, but the Red Men never had it as good—or as safe—as the U.S. Army Chemical Corps.

The latter has developed a new way to make colored smoke grenades safer—not only for the users but for the manufacturers, the American Institute of

Chemical Engineers was told on Sept. 28 in St. Paul, Minn.

The grenades, used by our armed forces for signalling purposes since World War I, were volatile and deteriorated quickly in storage. They also were difficult to manufacture because of their tendency to catch fire. The new grenades are safer to manufacture and can be

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stored longer, Philip E. Fisher, U.S. Army Chemical Corps Engineering Command, told a symposium on chemical warfare.

"We have recently made two changes in our grenades: the inherent thermal instability of the dye auramine was found to be greatly increased by quantities of moisture as low as 0.5 per cent," he said. "Numerous fires occurred on the production line. The fire starting reactions are presumed to involve ionization of the HCl (hydrogen chloride) in the auramine molecule."

"We tested other dyes and found a similar yellow color in a blend of two

parts benzenthrone . . . Grenades made with this blend dye showed much less change in burning time after 90 days storage at 60 degrees centigrade and the first production run was made without any fires, something almost impossible with auramine yellow.

The Second Change

"The second change was the elimination of the four five-sixteenth inch vent holes from the top of the grenade, leaving only the one seven-sixteenth inch hole in the bottom. This change was made after extensive testing showed virtual elimination of the flaming defect

and no accompanying harmful effect in storage or use.

"We have made grenades using about 4 per cent of several different plasticizers as binders for the dry mixtures, and selected polyvinyl acetate and a polyester resin for production testing. When these tests are complete, we expect to eliminate our dry-mix, high pressure loading method in favor of the wet, plasticized mix and self-hardening loading method. This will eliminate the slow inefficient compressing of fine particles in the munition, and reduce the fire hazard and the dermatitic hazard in the use of some of the dyes."

Preventing Pollution Not Always Costly

Cleaning up industrial waste waters to prevent stream pollution need not always be a costly job, according to J. N. Welsh, associate director of Hall Laboratories, the world's largest industrial water consulting firm.

Speaking before more than 30 foundry managers and superintendents of General Motors Corporation in Detroit, Welsh pointed out that in many cases the use of existing plant equipment and a few good housekeeping innovations can frequently eliminate the problem entirely, or at least keep capital outlays for treatment facilities to a minimum.

Drawing from his experience, Mr. Welsh cited the following midwest manufacturing plant as a case in point:

The plant's waste water contained such contaminants as soluble and lubricating oils, waste pickle liquor and rinse water, and cyaniding quench water.

When the plant manager learned that treating equipment to clean up the waste water leaving the plant would cost \$50,000 to \$75,000, he decided to have a survey made to make sure that he really needed the equipment proposed.

It was immediately apparent that each contaminant would require individual handling. It was also apparent, as the survey progressed, that a relatively small expenditure would suffice to purify waste streams sufficiently for them to meet local anti-pollution regulations for discharge into a nearby stream.

Shop workers were permitting oils from compressors, turbines, gear boxes or production machine tools, and spoiled coolants to pass into floor drains leading to the plant sewers. Drip receivers were

installed and the oily waste collected, then dumped on the coal stock pile.

The spray pond was equipped with a skim baffle to permit collection of floating oil and disposal on the coal stock pile. Arrangements were made for collection and disposal of waste soluble oils in the same manner. An earthen basin was shaped at the sewer outfall to act as an oil trap in case of accidental oil spills.

Arrangements were made to neutralize waste pickle liquors in the pickle tanks and dispose of the precipitated sludge in a lagoon on nearby plant property. Rinse water was disposed of in two underground oil storage tanks which were no longer being used for their original purpose.

An inexpensive feeding arrangement was installed to automatically introduce alkali into the rinse water on its way to one of the tanks. This neutralized the acid drag-out.

Settling of precipitated iron hydroxide occurred in the one tank and clear, neutralized rinse water was drawn off through a swing pipe and discharged into the plant sewage system. The sludge then passed to the second tank where it was concentrated and stored, eventually going to the lagoon.

Metal parts heat treated in cyanide salt baths were quenched in a continuous stream of water. Continuous overflow from this quenching process contaminated the main body of plant waste water. The situation was corrected by switching to a batch rinse procedure. With this change it was possible to reduce total cyanide waste to about 30 gallons per month.

The one remaining source of contamination was sodium dichromate used in some cooling water circuits for corrosion control. Substitution of sodium hexametaphosphate for the sodium dichromate eliminated contamination of plant waste water with the toxic sodium dichromate.

It cost the plant about \$5,000 to make all the changes discussed, and the survey by the water engineer cost even less. By these limited expenditures, plant management was able to save what would have been a sizable capital investment.

Solving a pollution problem is not always that easy . . . or inexpensive, Welsh concluded, but in nearly every case a plant survey by a trained water engineer will, in the long run, save management both time and money.

Carrying Coals

The meaning of the old saying—carrying coals to Newcastle—soon will change from an adage to a statement of fact. The Montauk colliery, last of the coal mines in this formerly coal-rich area, announced recently its seams were almost worked out after 450 years of mining, according to *Coal Age*.

It Floats

A floating grass cutter is giving golf greens a close, even shave, reports *Product Engineering*. The mower is built so it floats in front of the engine and is not affected by motor vibration or operator technique.

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C-7639 GENERAL MANAGER Grad. Engr. or Bus. Ad. age to 55; heavy exper. in irons, steel or non-ferrous forgings or castings & machining. Functional exper. as line supervisor in production or metallurgy. Must have at least 5 yrs. exper. as asst. or general mgr. of an integrated oper. or division. Company produces cast iron & non-ferrous castings from medium to large sizes. Mach. shop is well equipped. Will be resp. for production, metal., engrg. sales accounting etc. Compensation \$25/30,000 in total with part of it as a base sal. & part as bonus & profit sharing, for a foundry loc. Ohio employer will pay the fee.

C-7657 FIELD ENGR. Grad. CE or equiv. 3+ yrs. exper. in general field work on heavy construction for a contractor engaged in heavy type construction, sal. \$650/700 mo. loc. Chgo., employer will pay the fee.

C-7661 PROJECT ENGR. Mech. or Elect. 4+ yrs. exper. in design & devel. on controls & instruments. Duties: Take project from initial stage & follow thru up to production on controls, instruments, magnetic elect. & pneumatic circuits. Must be good idea man, sal. to \$10,000 dep. on exper. loc. Chgo. (in one year new plant will be in a western suburb) employer will negotiate the fee.

C-7663 CREATIVE ENGR. RESEARCH & DEVEL. BS, MS or PhD in Chem. or Ch.E. age 30-45; 5 yrs. exper. in adhesives or printing ink devel., know adhesives or printing ink devel. Duties: Creative analysis of new adhesives & printing inks along with the practical knowl. of solving production problems in these areas for a commercial prtr. of books, magazines & catalogues, sal. \$8400 loc. Chgo. employer will pay the fee.

C-7666 CHEMIST - METALLURGIST PhD-MS age to 40; 2 yrs. exper. chem. or met. research, pref. supv., know chem. or metallurgy. Duties: Regular research duties to start. Will screen & train to be tech. director in 5 yrs., occasional travel no car necessary for a mfg. sal. open loc. No. Ind., employer will negotiate the fee.

C-7667 STRUCTURAL ENGR. Grad. CE age 28-36; 3+ yrs. exper. in struct. component design. Duties: Act as consultant for service organization work

ENGINEERS

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984-MW INDUSTRIAL PLANT OR CONSULTING ELECT. ENGR. BSEE 32; 8 yrs. exper. in design & field superv. in all phases of elect. generation, transmission & distribution systems for municipal & indust. steam power plants, reg. P.E. Prefers Ohio Midwest or the West.

with consultants & mfgers. engrs. on structural components design for box beams, etc. Good personality, considerable customer contact, sal. \$75/8500 loc. Chgo. employer will negotiate the fee.

C-7669 DESIGN ENGR. ME or EE age to 45; 3+ yrs. exper. in heating control or elect. mech. controls. Duties: Creative ability to work on heating controls, domestic furnaces special switches, small mechanisms for a mfg. sal. to \$10,000 loc. Ill., employer will pay the fee.

C-7674 PROMOTIONAL ENGR. FIELD & OFFICE Grad. CE age 27-40 Duties: Asst. to Managing Director Trade Assoc. Will prepare tech. reports & articles, attend tech. meetings, discuss problems with mfgers. & promote use of concrete pipe. Good sales personality. Some travel by air but home most week ends, sal. \$7/10,000 dep. on ability & exper. loc. Chgo. employer will pay the fee.

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991-MW OFFICE OR FIELD ENGR. CONSTRUCTION BSCE 34; 2½ yrs. exper. designing irrigation systems, flood protection systems & related structures. 2 yrs. stress analysis & design of wooden structures. 4½ yrs. combination field & office engr. in construction. Good work organizer & manager Southwest, South or Midwest.

989-MW ELECTRICAL ENGR. BSEE 35; Power transmission & distribution 6 yrs. exper. Plant maint. power distribution—metering—fuse coordination —voltage regulation studies etc. 2 yrs. exper. Midwest.

Glass Detects Gamma Radiation

A new method for increasing the radiation sensitivity of glass may result in a more efficient system for detecting hazardous gamma radiation.

Scientists at Armour Research Foundation of Illinois Institute of Technology are using long glass fibers, specially coated, to achieve greater sensitivity. The fibers can be coiled into a small spool or disk and worn by laboratory and military personnel to measure exposure to gamma radiation.

The glass fibers can be calibrated like a thermometer. Exposure to radiation darkens the fibers, permitting an immediate reading. Conceivably, this type of glass dosimeter could replace film, almost universally used as a radiation indicator, but which must be developed to determine the extent of exposure. Such a device could prove practical for civil defense.

Research in fiber optics at the Foundation stimulated the idea for a dosimeter made of long glass fibers. Increasing the length of glass by stretching it into strands six to ten feet long makes it easier to detect radiation, and increases the sensitivity up to 100 times.

As part of the new process, a technique of coating glass fibers with lower refracting glass was developed by ARF. This coating protects the surface of the fiber and provides a constant surface absorption.

Foundation researchers also are considering the use of a neutron absorbing material in a glass dosimeter. When absorbed, neutrons give up their energy and discolor glass.

Goal of this research would be the

development of a glass dosimeter system sufficiently sensitive to permit direct readout.

Glass dosimeters offer many advantages. They are small, inexpensive, chemically inert and rugged, and provide an instant and permanent record of radiation exposure.

Separate Bids Favored in Survey

A recent survey of Architectural offices in the Chicago area has shown that 71 per cent are in favor of separate bids on plumbing, heating, ventilating and electrical contracts.

This information was obtained from a questionnaire sent out by the Coordinating Committee of Mechanical Specialty Contractors Associations of Chicago, which is composed of representatives of the Electrical Contractors Association of City of Chicago, Mechanical Contractors Chicago Association, Plumbing Contractors Association of Chicago, and Ventilating & Air Conditioning Contractors Association of Chicago. These four associations represent 413 individual contracting firms.

A total of 133 replies to the questionnaire were received, including all of the major architectural offices in the area. The importance of the subject, not only to contractors but also to architects, is evidenced by the fact that 42 per cent added significant comments in their replies, the majority of which were strongly favorable toward separation of all mechanical work from the general contract.

In addition to stating preferences, each architect was asked to indicate the actual practice prevailing in his office. The results show that 36 per cent of those polled take separate bids on all jobs, and another 40 per cent take them on more than half of their jobs.

Soil Mechanics Lab

A dual-purpose laboratory for soil mechanics has been established as a joint facility by Armour Research Foundation and Illinois Institute of Technology.

It will serve as a center for sponsored research in soil mechanics at the Foundation and also as an instruction laboratory for undergraduate and graduate students at Illinois Tech. The laboratory incorporates previous facilities used principally for instruction at IIT.

The areas of research will include such soil dynamics problems as underground protective structures, foundation design studies, stress wave transmission, and also other basic research in soil engineering. Special laboratory equipment has been installed for research activities which are now underway.

Coordinators for the laboratory's operations are Dr. Eben Vey, professor of civil engineering at Illinois Tech, and Ernest Selig, assistant research engineer at the Foundation.

Ball Bearing

Transporting the world's largest ball bearing to a Nike-Zeus radar site proved a problem for its builders, reports *Product Engineering*. The 14-foot ring, containing 88 four-inch balls, had to be rotated constantly enroute to prevent corrosion from road vibration.

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"Hot Die" Press Forging Technique

Better and more economical forgings will be possible with the new "hot die" press forging technique developed by the Armour Research Foundation of Illinois Institute of Technology in Chicago.

The new method, developed for the Aeronautical Systems Center of the Air Materiel Command, will introduce greater economy into the forging process by making it possible to approach the ultimate dimensions of a part more closely and by reducing the number of die impressions in a sequence. The post-forging stage will also benefit from lower costs through a drastic reduction in the machining required to finish a part.

Press forging has, since its innovation, been limited by one seemingly inherent drawback: the relatively cold die. A hot blank forged by a cold die loses its heat so quickly that within sec-

onds, thin sections and complete filling of deep die cavities are practically impossible to obtain. Also, the difficulty in removing the cooled part from the die necessitates a greatly exaggerated draft, or edge angle. These shortcomings result in extensive and costly finishing to obtain the final part, and it is not uncommon for the cost of this machining to exceed the original cost of forging.

In developing their hot die remedy, the team of metallurgists under the direction of Paul R. Gouwens were faced with a set of technical difficulties that had long stymied engineers.

A new die metal had to be found. If the present steel dies, heated to 1600° F., were to press down on a stainless steel blank heated to 2200° F., both would deform. An alloy was needed that would retain its compressive yield strength, as

well as its resistance to oxidation, at these temperatures.

A variety of commercial and laboratory alloys were tested under simulated hot forge conditions. Two commercial alloys were selected for actual forge testing—Inconel 713C, the first choice, and another that subsequently failed. Both of these alloys were unmachinable.

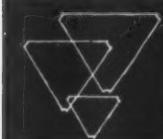
This complication had been anticipated, however. Even before the alloy tests began, it was known that the present technique of "sinking" the die by machining would be useless. Research for a suitable method of casting the die was initiated.

Sand casting had limitations which made it unsatisfactory, and a new foundry molding system was developed employing a moldable graphite mixture. This system produced a gas-free, strong die with a surface so smooth that it required no subsequent finishing.

All that remained was to put the components together and see if the system worked. Both of the alloys were cast without difficulty, and though the dies of the second choice metal cracked under stress, the dies of Inconel 713C successfully forged a variety of shapes at temperature-pressure couplings up to 1600° F. and 80,000 pounds per square inch.

The parts produced fulfilled every expectation. Thin sections were more easily formed, and the precision and intricacy of the forgings markedly exceeded those produced with standard methods. The ease of forging promised to shorten the sequence of dies presently required to obtain difficult shapes, and the reduced draft, coupled with the new precision, brought finish machining to a minimum.

Not only do the hot dies eliminate many of the problems in existing press forging techniques, they open whole new areas of forging enterprise. Many metals, such as those in jet aircraft parts which can be forged only in a narrowly limited temperature range, may now be more readily shaped. Other metals which are now considered unforgeable might be made to yield under the persuasion of a hot die. And refinements are inevitable. Hotter dies, stronger die metals, and further refined casting methods will carry with them even better quality and economy for the forging industry.



WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer magazine.

William C. Kerndt, attending Chicago Technical College.

Axel H. Magnuson, Sales Engineer, Phelps-Dodge Copper Products Corp., 100 W. Monroe St.

Frank B. Maloney, Sales Engineer, Hauck Manufacturing Co., 4569 W. Harrison St.

Herbert Schaible, Engrg. Assist. to the Army Engr., Hq. 5th U. S. Army, 1660 E. Hyde Park Blvd.

Michael J. Angerame, Design-Assist. Proj. Eng., Chicago Aerial Industries, 1840 Hawthorne St., Melrose Park, Ill.

Ralph C. Reno, Vice Pres. & Editor, Telephony Publishing Corp., 608 S. Dearborn St.

Clifford E. Huntley, Manager-Equip. Engrg., Western Electric Co., Inc., Hawthorne Station.

Zachary Rosenman, Systems Engr., Dept. of R & D Engrg., International Telephone & Telegraph, Kellogg Com. Div., 6650 S. Cicero Ave.

Jack E. Garrett, Dept. Chief, Western Electric Co., Inc., Hawthorne Station.

Raymond F. Faron, Constr'n. Supt., Palumbo Excavating, 2738 W. Harrison St.

Jack S. Dawson, Deputy for Instl. Engrg., 56th Fighter Group, U.S.A.F., O'Hare International Airport, Park Ridge, Ill.

Jozef Cibor, Civil Engr., Harza Engineering Co., 400 W. Madison St.

Jerry Bouska, Engineer, Commonwealth Edison Co., 1319 S. First Ave., Maywood, Ill.

R. V. Sperlik, Engineer, Commonwealth Edison Co., 1319 S. First Ave., Maywood, Ill.

Joseph G. Reid (Rein.), Mechanical Engineer, 1437 Milner St., Birmingham, Ala.

Thomas E. Zinkus, Assistant Engineer, Illinois Bell Telephone Co., 208 W. Washington St.

Elwood DeZwart, Estimator & Constr. Supt., Shaw Metz & Associates, 208 S. LaSalle St.

Donald R. Brown, Department Chief, Western Electric Co., Inc., Hawthorne Station.

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Reactor Feasibility Study Planned

A joint study to explore the feasibility of an advanced type of nuclear power reactor is to be undertaken by Nuclear Power Group in cooperation with Atomics International, a division of North American Aviation, Inc.

The study will be concerned with the possibilities of the graphite-moderated, water-cooled, boiling and superheating reactor concept for power generation, according to the announcement made by Nuclear Power Group.

"Preliminary studies made by NPG engineers during the past ten months," it said, "have proved sufficiently promising to warrant further study in cooperation with a manufacturer in the nuclear field to determine if the concept is worth carrying into the research and experimental stages."

No Plan to Build

"There is no plan at this time to build such a reactor. The cost of the study is estimated at about \$150,000. NPG and Atomics International will each bear the cost of the work they do."

NPG is a research organization formed by American Electric Power Service Corporation, Bechtel Corporation, Central Illinois Light Company, Commonwealth Edison Company, Illinois Power Company, Kansas City Power & Light Company, Pacific Gas and Electric Company and Union Electric Company. Headquarters are maintained in Chicago.

The reactor concept to be studied would use graphite blocks as a moderator and uranium as fuel. The reactor would consist of a large pile of graphite blocks in which holes are pierced for insertion of the fuel elements.

Other holes in the graphite blocks would contain metal tubes in which the water boils and the steam is superheated.

One advantage of this concept would be the production of steam at modern high pressures and temperatures. Another is that there would be no limitation on the size of such a reactor and refueling could be done while the plant was in operation.

NPG, which was formed six years ago, is a co-sponsor of the Dresden Nuclear Power Station, the 180,000-kilowatt boiling water atomic power plant now nearing completion 50 miles southwest of Chicago.

Atomics International has been doing research and construction work on atomic reactors for over 10 years. It has headquarters at Canoga Park, California.

The major NPG contribution to the advancement of atomic power has been in connection with the building of Dresden Station. The group is contributing \$15,000,000 as a research and development expense toward the project cost.

General Electric Company is building Dresden for a fixed price of \$45,000,000. The balance of \$30,000,000, plus site and overhead costs, is being paid by Commonwealth Edison Company. Commonwealth Edison will own and operate the plant.

Dresden is the largest all-nuclear power station under construction in the country. It is expected to be in regular service in mid-1960.

Kaiser Engineers Get Contract

The Atomic Energy Commission has awarded a contract to Kaiser Engineers, Division of Henry J. Kaiser Co., Oakland, Calif., for a study of the potential use of nuclear power at remote military installations. Estimated cost of the study is \$515,000.

Under the contract, the company will compare cost of conventional power with the estimated cost of nuclear power for military installations for which new generating capacity of 5,000-40,000 electrical kilowatts is projected for the period 1963-1970, designate the type of reactor which apparently would be most suitable at each installation, and recommend the most economic method of plant construction. The latter might include: on-site assembly and erection of components, plant fabrication with minimum on-site assembly and erection, and off-site construction on a floating mount, such as raft or barge. The reactor types to be considered include those systems which are technically well defined and proven at present or can be reasonably expected to be proven by

the time construction would begin.

Results of the study will be submitted to the Commission by Feb. 1, 1960. In addition to the recommendations on plant type and mode of construction, the report will include cost estimates and construction schedules for each plant, detailed capital and operating cost estimates for both nuclear and conventional plants for each of the 10 most nearly economic combinations of remote-application nuclear power plant types and descriptions of proposed methods of construction.

Food Engineering?

Jawbreaker candy balls are being used in the oil industry to dislodge paraffin in crude lines, reports *Petroleum Week*. Before the use of jawbreakers, a clogged pipe had to be pulled out and cleaned, shutting down the well. Now, the candy balls are rolled down the one-inch pipe. As they fall, they break up paraffin deposits. A screen catches them at the bottom, and they dissolve.

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Scale Model Becomes A Great Tool

Ten years ago "very few chemical engineers considered the scale model very seriously." Today "it has become the greatest tool developed by the chemical engineer."

"...with its proper use the chemical engineer can design better plants, build these plants for less money and reduce the operating and maintenance costs," Robert R. Kitchin, U.S. Army Chemical Engineering Command, told a chemical warfare symposium on Sept. 28 in St. Paul, Minn., during the 41st National Meeting of the American Institute of Chemical Engineers.

"In the opinion of most model concept enthusiasts the intangible benefits are really more valuable in the long run than the concrete savings." He listed nine advantages of models: reduction in the number of expensive field changes, elimination of pipe interferences, use of the model as a training and communications aid, major modifications can be planned so that shutdown time can be reduced to a minimum, improved communications with customers, the estimating job is made easier, jurisdictional problems with unions can be reduced, better use can be made of more experienced engineers and specialists such as electrical, refrigeration and maintenance engineers and field engineers can control construction crews more effectively.

"In brief . . . the intangible benefits save time, save money, improve communications, better utilize senior and specialist engineers and better control construction. Maybe a realistic figure can never be set by any of these benefits but it would be very large if one could be set."

He listed concrete benefits as the

elimination of preliminary drawings, elimination of the cost of checking drawings, reduction in the cost of other drawings, elimination of most drawings of complex piping, savings in the cost of maintaining drawings in an up-to-date status.

"This tool (the scale model) is still being developed by adopting new techniques. Dimensional photographs are

being used by some advanced companies instead of drawings. This has some problems as yet not resolved to the satisfaction of most companies. It appears to be growing in acceptance so that it soon may be standard in the use of models . . . The tool is new and expanding, but today its record is such that no engineering firm can really afford to do without it."

Commonplace Test Chambers

Test chambers simulating conditions in outer space "will be commonplace in the scientific laboratories all over the world in the near future," the American Institute of Chemical Engineers was told in St. Paul, Minn., on Sept. 28 during a symposium on chemical warfare.

The prediction was made by Alfred N. Bloch, of the U.S. Army Chemical Corps Engineering Command in a paper, Environments—Their Simulation and Exploration in Test Chambers. The paper described the inadequacies of present methods of environment testing of material by the Defense Establishment, and advocated that test chambers simulate actual weather conditions to improve testing.

"Simulating environments in test chambers is an ambitious project," he said. "We are well aware of its scope and the serious problems with which we will be confronted. Even a partial success would be satisfactory and might open new horizons."

"With our intentions, we are only slightly ahead of a trend toward the captivation of environments. It is taking shape right now."

"We want to re-create an environment

in a test chamber in order to control a phenomenon—the climate—which in the natural environment we cannot control. The scientific world, on the other hand, is confronted with new environments which have not yet been explored at all and which we will have to bring into test chambers, because in nature they are, for the time being at least, inaccessible—outer space.

Mental Reservations

"It can be readily predicted that recreating outer space conditions in test chambers will be commonplace in the scientific laboratories all over the world in the near future. So, pretty soon, we will be in very good company and the mental reservations we feel now—they are advanced against any new concept as long as it is not proven—will melt away."

"Our object itself is an undertaking for which we have no time in an emergency. The knowledge and the techniques we want to acquire are, however, urgently needed, if we want to remain competitive in the arms race. It is therefore strongly felt that we should use the present (relative) lull between storms to bring the natural environment into the test chamber. We are convinced it will pay."

For Sale Cheap!

More than a dozen Doric columns were left standing in the yard of a German stone-cutting firm when the roof fell in on Adolf Hitler and Benito Mussolini, reports *Engineering News-Record*. They are still standing there, and the firm would like to sell them—cheap. Hitler ordered the 50-foot columns as a gift for Il Duce some 20 years ago, but payment and delivery were never made.

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Film Tracks Atom Particles

University of California scientists are using a special Kodak missile tracking film to trace the smallest missiles in the world—atomic particles.

The film is called Linagraph Shellburst because of its wartime use in recording anti-aircraft shell explosions. It now records tracks of high energy atomic particles such as pi mesons in the university's new \$2,000,000 instrument known as a "bubble chamber."

Particles emerging from the 6-billion electron volt Bevatron at the University's Lawrence Radiation Laboratory are piped to the six-foot long bubble chamber, which contains 150 gallons of liquid hydrogen. As the particles pass through the hydrogen, they leave streaks of bubbles similar to jet vapor trails. The streaks are then photographed through the chamber's 5-inch thick optical glass cover.

Bubble chamber photographs made

recently indicate the presence of strange particles of antimatter called "anti-lambdas," university scientists said.

Antiparticles, according to nuclear physicists, are building blocks in a bizarre state of matter forming a kind of "mirror image" of the ordinary matter of which the earth is made.

William F. Swann, manager of Kodak's special sensitized products sales division, which supplies film for the project, said the nuclear particles were photographed by a group headed by Dr. Luis W. Alvarez, professor of physics and associate director of the Lawrence Radiation Laboratory. The experiment was run by Dr. Lynn Stevenson, associate professor of physics, and Dr. Phillippe Eberhard, physicist on leave from the National Science Research Center of France.

The new bubble chamber is expected to yield many times the information

available with previous research methods, the scientists said. The new sub-nuclear unit is the third particle of antimatter to be discovered with the Bevatron. Earlier ones were the antiproton and the antineutron.

Vitro Contract

Vitro Engineering Company, a division of Vitro Corporation of America, has been awarded a contract to design and engineer a \$1.7 million high-level radiation laboratory for the U. S. Naval Research Laboratory, Washington, D. C., it has been announced.

The radiation laboratory will provide facilities in support of the Navy's increasing nuclear development program and its application to power plants for submarines, surface vessels and aircraft. It will be used to study radiation effects on construction materials for the improvement of the reliability, efficiency and safety of nuclear-powered vessels.

The proposed one-story, reinforced concrete building will contain five "hot" cells for remote-controlled operations at working radiation levels ranging from 1,000 to 10,000 curies.

Four metallurgical cells, connected by a remote-controlled transfer system will provide facilities for the remote analysis, machining, metallurgical examination, physical measurement and mechanical testing of materials. The fifth cell will be a general purpose unit designed for radiation levels up to 10,000 curies.

Radioactive source materials will be provided by exposure in the U. S. Naval Research Laboratory's research reactor built in 1956.

Other features of the facility will include thick concrete shielding walls and remote-operated laboratory equipment.

Vitro Engineering Company is engaged in the design, construction and operation of advanced facilities for government and industry in the fields of nuclear energy, chemical processing, metallurgical development and defense. In the past 17 years, Vitro has designed more than \$1 billion for government and industry including the gaseous diffusion plants at Oak Ridge, Tennessee, for the separation of uranium isotopes and Consolidated Edison's 275,000 KW nuclear power station now under construction at Indiana Point, New York.

MIDWEST ENGINEER

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High Frequency Sound Does the Dishes

High frequency sound waves at 40,000 cycles per second, far above the range of human audibility, alternately compressing and decompressing ordinary tap water, will reduce the complete washing-and-drying cycle of 25 to 30 minutes for conventional dishwashers by about one-half, and remove stubbornly clinging food particles which formerly had to be cleaned off by hand, in the first ultrasonic dishwasher shown by Narda Ultrasonics Corp. at a recent I.R.E. Show (Institute of Radio Engineers) at the N. Y. Coliseum.

This is the latest "breakthrough" in a brand new industry whose commercial and military sales reached \$25 million last year and are expected to double in 1959. Within five years, industry leaders believe there will be a \$150 million annual market for ultrasonics equipment.

Ultrasonics is a term referring to sound waves above the audible-to-humans range, about 20,000 cycles per second and up. In industry, ultrasonics is used to describe all applications of sound energy to industrial processes, although many ultrasonic devices use frequencies within and even below the audible range. Military sonar applications (underwater detection or communication) are not usually included.

Not Quite Ready

Narda Ultrasonics' dishwasher is not quite ready for the market, but the working model which was displayed at the I.R.E. Show is expected to be in production later this year. Narda's engineers are not concealing their pride in their achievement. No other manufacturer has yet announced a practical ultrasonic dishwasher for household use, though some have hinted that such models were "just-around-the-corner."

Known as the "Vanguard," the new Narda household ultrasonic dishwasher is a mobile, roll-around unit which can be plugged into any 110 volt electric outlet and hooked up to the normal household plumbing system. It is designed to operate with normal dishwashing detergents and tap water.

According to Paul M. Platzman, executive vice-president, the unit is completely automatic and is equipped with a motor-driven pump and food grinder, and has an automatic sequence-timer for

controlled cycling of the power rinse, ultrasonic wash, final rinse and hot-air drying phases.

"With ultrasonic dishwashing there will no longer be any need for hand scrubbing of dishes to remove stubbornly-clinging food particles," he said. "Fried egg, hardened sugar and coffee residues in the bottom of the cup, even lipstick traces, all will slide off in a few seconds. The uncanny ability of ultrasonic agitation to remove food and other foreign matter 'frozen' to dishes and cutlery and leave them sparkling clean is due to the cavitation action of high frequency waves.

Vacuum Bubbles

"These waves," he explained, "at 40,000 cycles per second, far above the range of human audibility, alternately compress and decompress the water in the sink. This action causes myriads of tiny vacuum bubbles to form and collapse with tremendous force, which 'blasts off' all traces of contamination from the items being washed."

Ultrasonic machines are used for hospital and military and industrial cleaning and degreasing. The aircraft, electronic and missile makers have been a major spur to the growth of ultrasonics. Before the development of ultra-

sonic cleaners, jet-engine nozzles and oil filters had to be thrown away when dirty. Now embedded residue can be removed in minutes through the use of sound energy. The sound waves whip the water into millions of microscopic bubbles which burst thousands of times per second against the material, ripping dirt away.

According to Platzman, a graduate engineer of Georgia Tech., the newer lines of ultrasonic equipment being made by the industry include units for non-destructive testing, thickness gauging, flaw detection, and similar inspection purposes; chemical processing; deaerating of boiler feed water and other "gas problem" liquids; die and mold shaking and other high frequency vibration; underwater signaling and navigation; remote control of TV sets, garage doors, reactors, and other processing equipment and depth gauging.

Smog Gone

A catalytic converter that can be incorporated into automobile mufflers to eliminate 60-to-73 per cent of the exhaust hydrocarbons may alleviate acute smog problem in many cities, according to *Chemical Engineering*.

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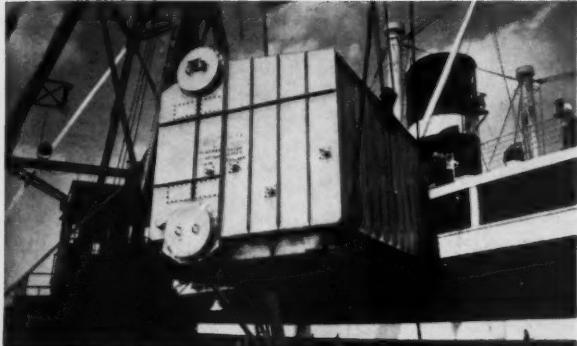
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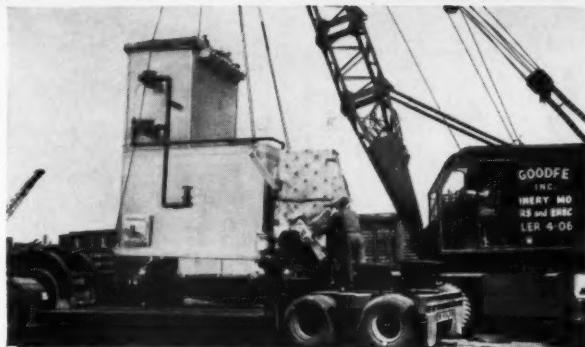
i



A C-E Package Boiler, Type VP, en route to Europe. This boiler type is available with capacities from 4,000 to 90,000 lb of steam per hr, with pressures to 700 psi and temperatures to 750 F in certain sizes. It is designed for oil or gas firing. Several hundred of these units are now in service.



A shop-assembled Controlled Circulation Boiler, Type PCC, being prepared for shipment. This type unit is available with steam capacities from 80,000 to 120,000 lb per hr, and with pressures and temperatures to 1000 psi and 900 F. For special applications, designs are available to provide higher steam pressures and temperatures. Seven PCC Boilers are now in service.



A shop-assembled C-E High-Temperature Water Boiler, Type HCC, being unloaded at a midwest manufacturing plant. It is one of two 12-million-Btu boilers used for plant heating. Available for capacities from 10 million to 300 million Btu, this unit type is shop-assembled in sizes up to 50 million Btu for oil or gas firing — up to 40 million Btu for coal firing. Currently, more than 50 HCC Boilers are in service or on order.

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The economies inherent in shop-assembled boilers can now be yours even if your steam requirements are as high as 120,000 lb per hr. The C-E line, consisting of three basic unit types, has been expanded to include pressures, temperatures and capacities well beyond normal package-type limits.

The standard, natural-circulation, **C-E Package Boiler—Type VP**—is now available with capacities to 90,000 lb per hr, and with pressures and temperatures to 700 psi and 750 F.

Where greater steaming capacity is required, or where higher pressures or temperatures are needed for industrial processing or power generation, the shop-assembled **C-E Controlled Circulation Boiler—Type PCC**—is available. It is designed for the 80,000-to-120,000-lb capacity range, with pressures to 1000 psi and temperatures to 900 F. For special applications, this unit is also available for considerably higher pressures and temperatures.

The **C-E High-Temperature Water Boiler—Type HCC**—is an ideal type for large space-heating and certain

process uses. It is also available in shop-assembled form for capacities to 50 million Btu per hr. It is designed for pressures to about 500 psi, and can provide water at 450 F or higher.

The new, high-capacity ranges of these shop-assembled units represent the logical evolution of familiar and successful designs that have been proved in service for quality, economy and performance.

Catalogs on any or all of these units available on request.

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